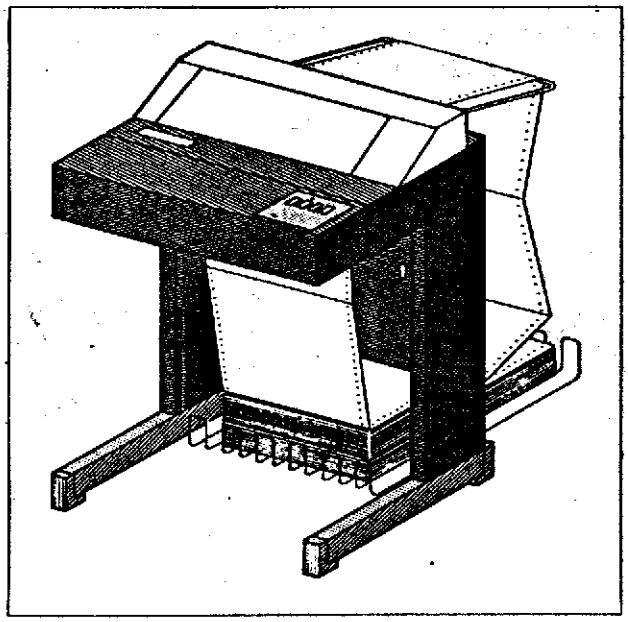
PR 1350

IPSO Printer
Reference Manual



olivetti

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PREFACE

This manual presents the performance and the main characteristics of the PR 1350 auxiliary printer.
It has been prepared for your need-to-know this peripheral unit. The product described makes use of an IPSO interface (Olivetti Standard Peripheral Interface).

SUMMARY

Explanations are given of the machine features, the print operation, the paper service devices, the ribbon and its devices, the IPSO interface and programming procedures.
In addition it illustrates the operating procedures for using the printer, its physical features and some data about its installation.

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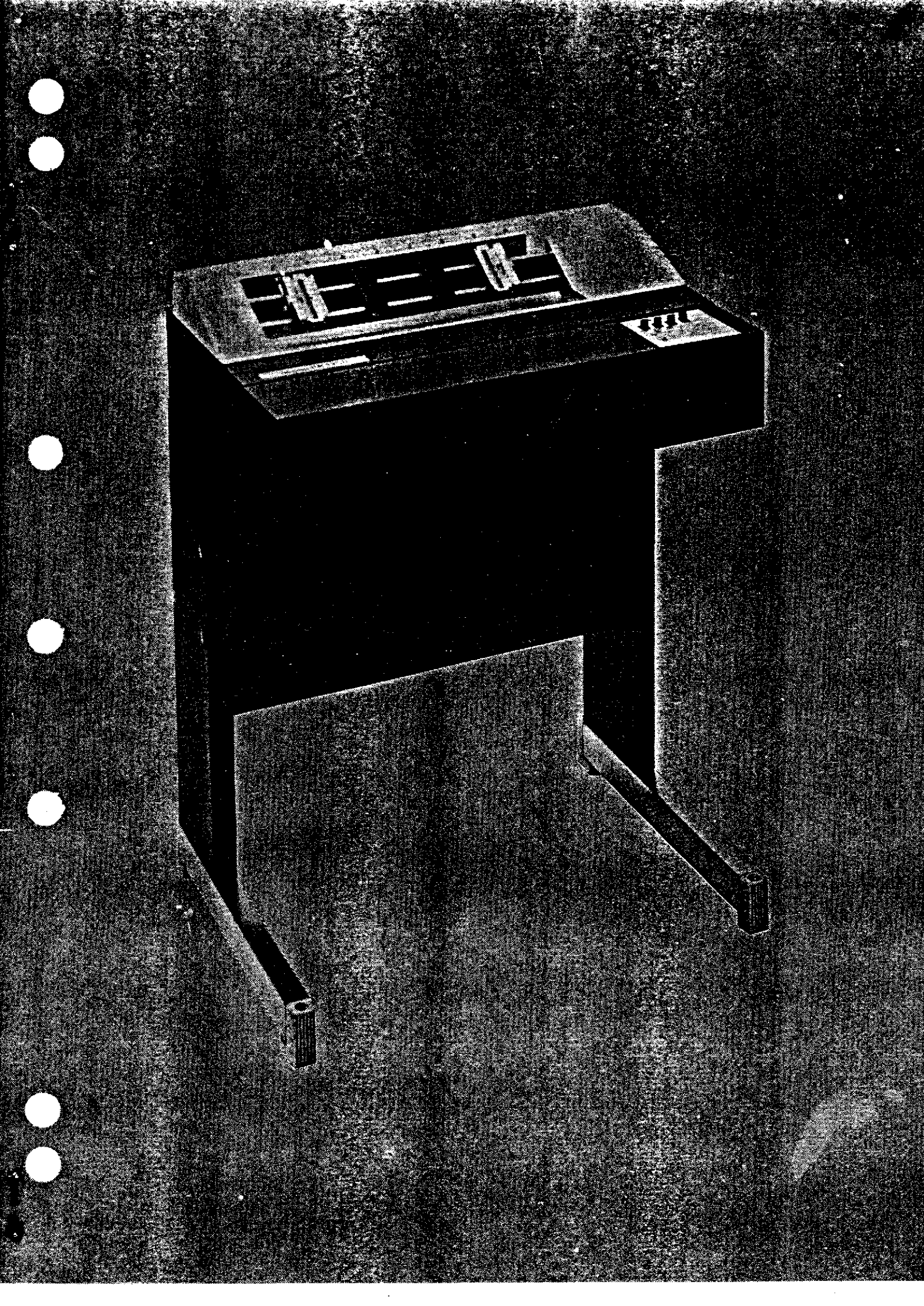

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INTRODUCTION

PR 1350 is an auxiliary serial dot printer.

It is used as a peripheral unit for Olivetti systems with IPSO interface, particularly A5, A6, A7, TC 800, DE 523, TCV 270, SP 600, P6060, P6040, DE 700.
The PR 1350 is equipped with two IPSO connectors used for daisy chain connection of up to 4 units.
This unit, called PU 1450 and described under separate cover (code 7541.30.2), is also intended as peripheral unit for O.E.M. (Original Equipment Manufacturers) systems using the following interfaces:

- CENTRONICS
- SYCOR
- V24.

The standard features of PR 1350 printer are:

- simple mechanical structure
- absence of print platen
- desk size
- generalized use of microprocessors
- bidirectional print, with run optimization and increased speed during no-print stretches (tabulation speed)
- easy maintenance.

PR 1350 is a simple-structured unit equipped with a 7 needle printing head (vertical layout), ribbon cartridge, paper sprocket feeder, downside paper feed.

The casing is attached to the chassis, on which the mechanical structure is also assembled; the electronic boards, and power supply unit, are placed under the mechanical structure, into the chassis.

The casing forward section houses the console of control switches.

The characters to be printed are sent by the central unit, via interface, to a storage buffer, capable of containing a whole print line of characters, and are then sent to the printing head.

Figure 1 shows the block diagram of PR 1350 printer.

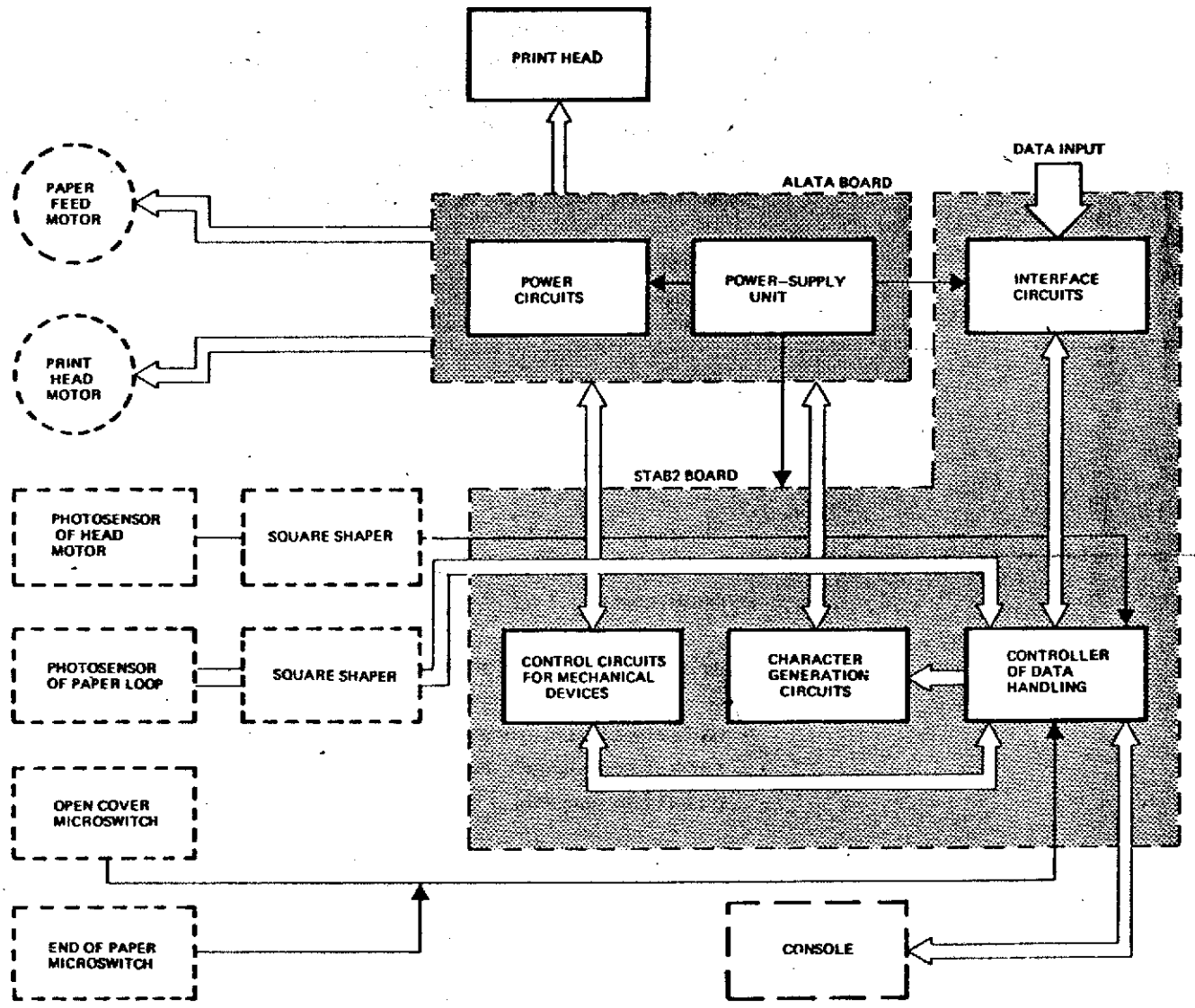

Figure 1 PR 1350 Block Diagram

1. PERFORMANCE

This chapter deals with the performance and general characteristics of PR 1350 printer.

Printing Operation

PR 1350 auxiliary dot printer works in serial mode and uses a 7-needle printing head in vertical layout in order to obtain a 7 x (4+3) printing matrix.

Optimization of Printing Head Run

PR 1350 has bidirectional printing with optimized run: it is possible to control the printing head in both senses, by means of a program contained in the controller, so as to obtain the best print rate according to the format (see page 2-5).

Printing Pitch

Two character pitches are possible: 1/10 in or 1/16.6 in; in both cases the elongated printing is available, the pitch therefore doubles (see page 2-10).

Selection of the Printing Pitch

The selection of the printing pitch can be done by console or by central unit; the elongated printing is controlled only by central unit.
If the 1/16.6 in pitch has been selected by console, the command to change pitch (to 1/10 in pitch), sent by the central unit, will not be executed.

It is not possible to change the printing pitch during a line; the change is possible only from line to line (the same for elongated printing).
When changing the pitch, the eventually selected elongated printing mode is cleared.
Elongated printing mode is never available at the machine switch-on.

Tabulation

When the printing head travels a distance greater than 10 characters (at 1/10 in pitch or 21 characters per 1/16.6 in pitch) to reach the beginning of print-

ing area, its speed is greater than the printing speed. The same occurs when using elongated printing mode for distances greater than 5 characters (at 1/10 in pitch) or 10 characters (at 1/16.6 in pitch).

The PR 1350 control unit does not contain any program for the horizontal tabulation.

Automatic Printing

When the number of characters sent by the central unit exceed the buffer storage capacity, automatic printing occurs without waiting for the specific command.
For maintenance purpose, it is possible to start by console the automatic printing of a diagnostic text.

Characteristics

The general characteristics of the print are:

- character matrix:
  7 x (4+3)

- matrix height:
  2.54 mm (0,10 in)

- printing mode:
  serial (character by character)

- printing speed:
  90 char/s (in both directions)

- tabulation speed:
  190 char/s

- printing pitch:

  . 1/10 in (2.54 mm - 10 characters per inch)
  . 1/16.6 in (1.53 mm - 16.6 characters per inch)

- print capacity:

  . 132 char/line (at 1/10 in pitch)
  . 220 char/line (at 1/16.6 in pitch)

- max sizes of the normal character:

  . height: 2.54 mm (0.1 in)
  . width : 2 mm (0.08 in)

- standard character set for national alphabets (96 ISO characters)

- double set of characters for bilingual alphabets (96/128 KATAKANA characters)

- set of characters available on specific request.

Paper Feed

It is obtained by means of the following devices:

- device for paper movement and support, consisting of two sprockets controlled by a stepping motor and some intermediate paper stands, adjustable according to the form width

- device for the vertical control of the format, consisting of a small optical reader of a punched tape loop controlling the paper skips.

Usable Forms

Continuous forms, laterally punched, having a variable width from 3 in (76.2 mm) to 15 3/8 in (390.52 mm). The length of the single form must not exceed 381 mm (15 in).

Number of Copies

It is possible to obtain 1 original and 4 copies (fanfold form), by using a 60 gr/mq selfcopying or backcarboned paper, or by using a 45 gr/mq paper with 20 gr/mq carbon sheets; the total weight must not exceed 370 gr/mq.
The positioning of the printing head, according to the number of copies to be printed, is done manually by means of an adjusting device.

Line Spacing

- 1/6 in (4.23 mm)

- time for one line spacing: 60 ms

- speed during the paper skip: 0.15 m/s (corresponding to 28 ms for each line spacing)

- end-of-paper detection at 7 line spaces before the end of form.

Vertical Tabulation

Pre-programming of the vertical tabulation allows:

- vertical tabulation
- top of form phasing
- bottom of form skip.

The above are permitted thanks to an optical reading of the punched tape loop.

Opening of the Cover

The opening of the cover of the mechanical assembly, when PR 1350 is turned on, stops all operations in progress and sets the printer in "out of service" condition. The printing head reaches the new line position automatically when the cover is closed. The contents of the line buffer are lost and the electronic circuits are cleared.

Clutch

The clutch device allows the alignment of the printing lines with the mark on the sheet.
By moving leftwards the knob, assembled on the square bar (see page 2-2), the paper feed sprockets are disengaged from the control mechanism.

Ribbon Services

Ribbon

The inking of the characters is achieved by means of the MATRIXCART cartridge (see figure 4-1) containing a ribbon assembled in a Mobius band form, so as to allow the use of both ribbon sides and to eliminate the inversion device.
The ribbon moves in constant direction, during any run of the printing device, with a speed equal to 1/3 of the printing head carriage speed.

Characteristics

- Kind of ribbon: one colour, black inked, nylon texture (ink percentage in volume = 25%)

- ribbon height: 13.2 mm

- cartridge life: 1.5×10^6 characters under normal use.

Options

The options available are described in the following paragraphs.

Manual Front Feeder MFF 4806

A card feeder, with manual roller opening and closing, can be assembled over the printing support bar (see figure 1-1).
It is possible to superimpose cards handled by the feeder and paper forms handled by the sprockets.

The card guides are laterally adjustable according to the width of the paper form to be printed (90 to 341 mm).
The feeder is controlled by the stepping motor of the sprocket, through some gears.

No "open rollers" detection is provided.

The feeder can be used also for continuous paper forms because they are introduced from the bottom.

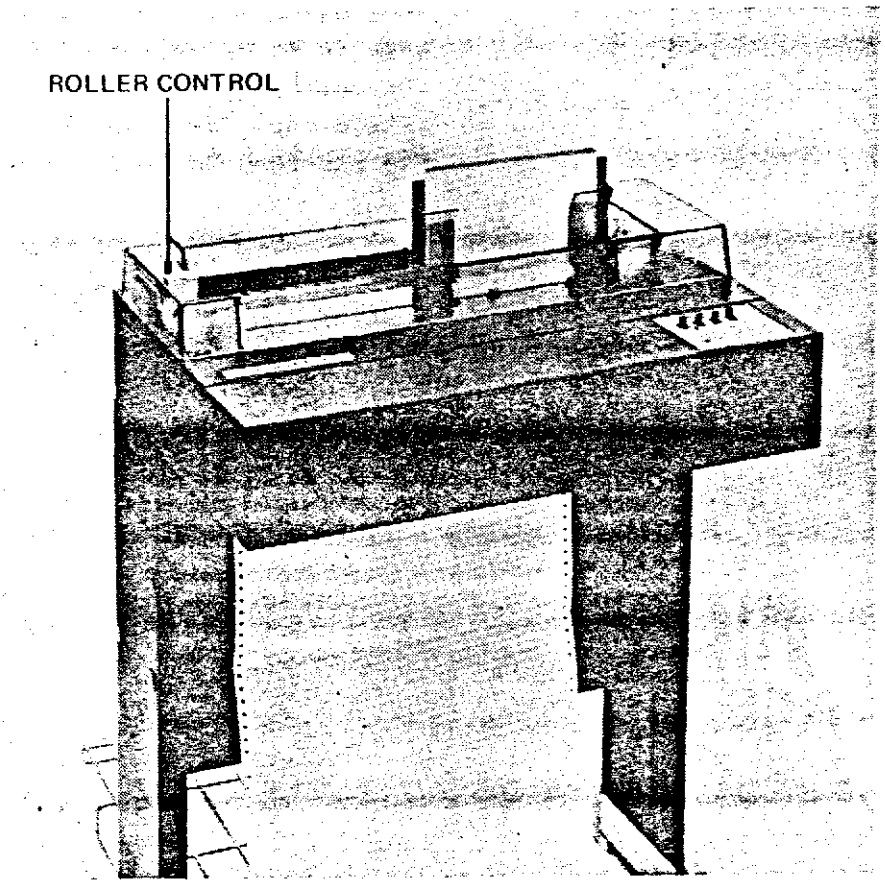

Figure 1-1 PR 1350 with MFF 4806 (Manual Front Feeder)

When using the MFF, the special transparent cabinet is to be assembled on the cover (see figure 1-1).

A lever on the left side of the printer controls the opening of the rollers and allows the card feed.

Pin Feed Device PFD 4813

This device allows the form feed (original only or original and 3 copies) and the paper tearing at a reduced distance from the print line (60-65 mm).

The paper feed is carried out, in alternative to the sprocket, by two small plastic pin-wheels driven by a square bar, and sliding on the bar itself for the whole length of a line.
Between the two wheels there are, sliding on the same bar, the intermediate stands of the paper.
The distance between the pin feeds is adjustable from 76 mm (3 in) to 378 mm (14 7/8 in).

The motion of this unit is obtained by the sprocket stepping motor via a cog belt and is controlled by the vertical tabulation unit.
When using the PFD, the special cabinet with cutting edge is to be assembled on the cover (see figure 1-2).
The multicopy forms must be torn at the fan-fold, the single-copy form can be torn anywhere.
The pin-feed is incompatible with the MFF.

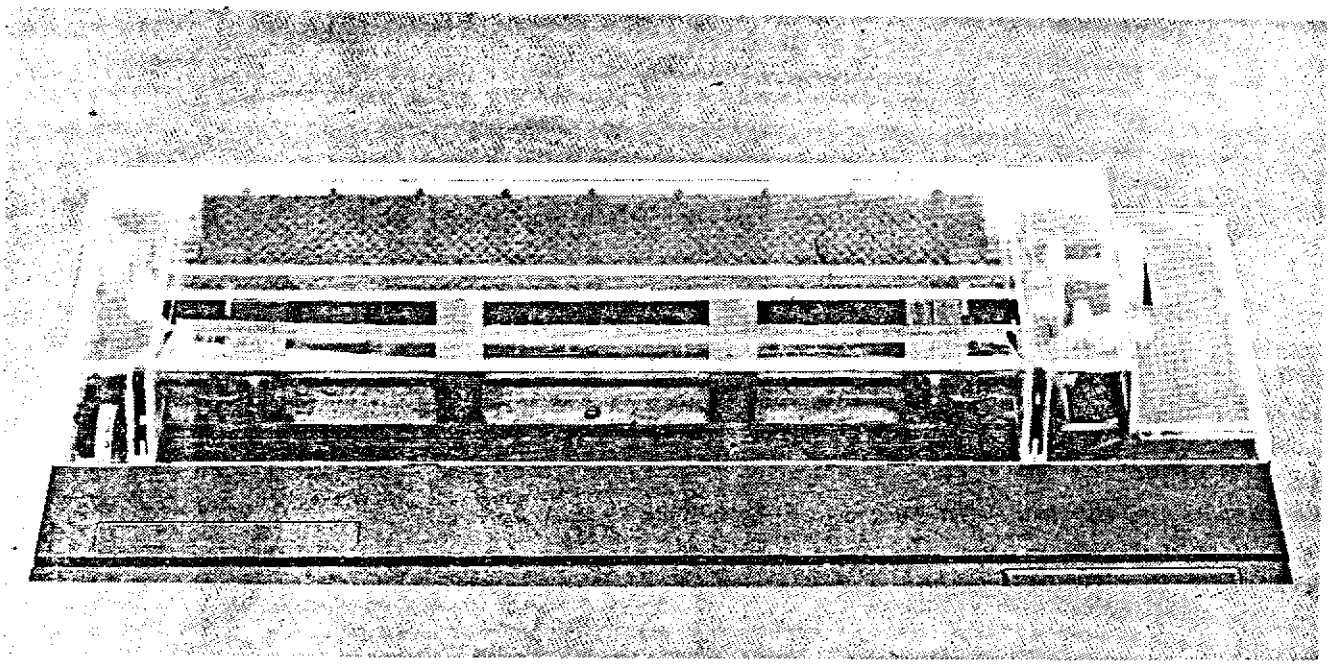

Figure 1-2 PR 1350 with PFD 4813 (Pin Feeder Device)

Acoustic Operator Call BEL 1350

The buzzer, controlled by BEL signal from CU, gives an acoustic signal, lasting about 2 seconds, to signal that the printer is in LOCAL condition.
If programmed, the lamp of LOCAL lights up.

Sycor Interface Adapter CTR 2867

This option is required for the connection of the TCV 280 system.

V24 Interface Adapter CTR 1324

This option is required for the connection of the P6060 and P6040 systems.

Special Functions

The special functions are set by proper optional jumpers on a socket of STAB2 board; they are:

- 1800 char/s transfer rate (during the line spacing the transfer rate is 1000 char/s) instead of 1000 char/s
- exclusion of the printing of the mark ||| .
  This mark, used to indicate "unknown character", can be excluded from printing; in such a case the character following the unknown one is printed in its place .
- peripheral control unit always selected
- "End of paper" signal setting the unit in LOCAL condition
- exclusion of CR control
- light up of LOCAL lamp (when the printer is in LOCAL condition).

Behavior of PR 1350 at Start-On

When the PR 1350 is started, the printing head automatically reaches the left margin, LOCAL lamp lights up and subsequently goes out (if programmed).
If the LOCAL lamp does not go out, the printer is not properly set or faulty.
When the bell is present, it usually rings when the voltages are reaching their nominal values.

Local

When PR 1350 is in LOCAL, it is possible:

- to control the line space (LF) and the form phasing (FF)

- to control the TEST MODE which, on program, is able to give the following performance:

  . printing the buffer contents (1)

  . 1 line spacing

  . elongated printing of the whole characters set on one line (66 characters at 1/10 in or 110 characters at 1/16.6 in) with pitch selection by console

  . printing a second normal line (132 or 220 characters) with pitch selection by console; the printed character set is the one contained in the printer; this test checks the correct running of the printer

  . rotate clockwise and continuously the printing head motor (2)

  . rotate counterclockwise and continuously the printing head motor (3); sequences 2 and 3 are used for adjusting the motor and are programmed, when necessary, by the service engineer

- to insert the paper and the punched tape loop and to change the ribbon cartridge.

2. PRINTING OPERATION

The PR 1350 printing operation is carried out by a printing head acting on a ribbon located between the head and the paper (see figure 2-1).
A plastic stand keeps the ribbon far from the paper to avoid smearing the paper.

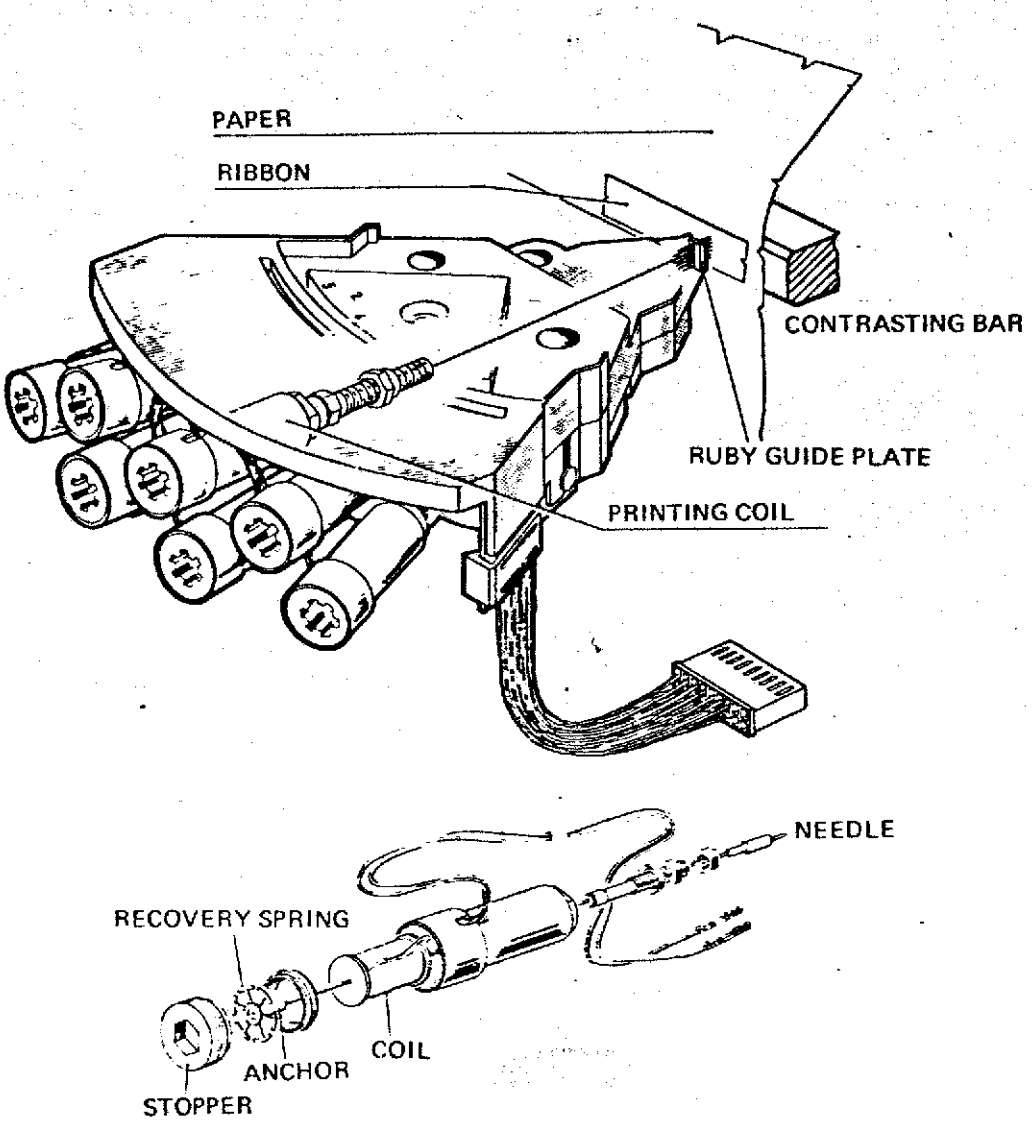

Figure 2-1 PR 1350 Printing Head

The printing head is assembled on the carriage which also houses the ribbon cartridge. The carriage moves in both senses, driven by a stepping motor through a cog belt (see figure 2-2).

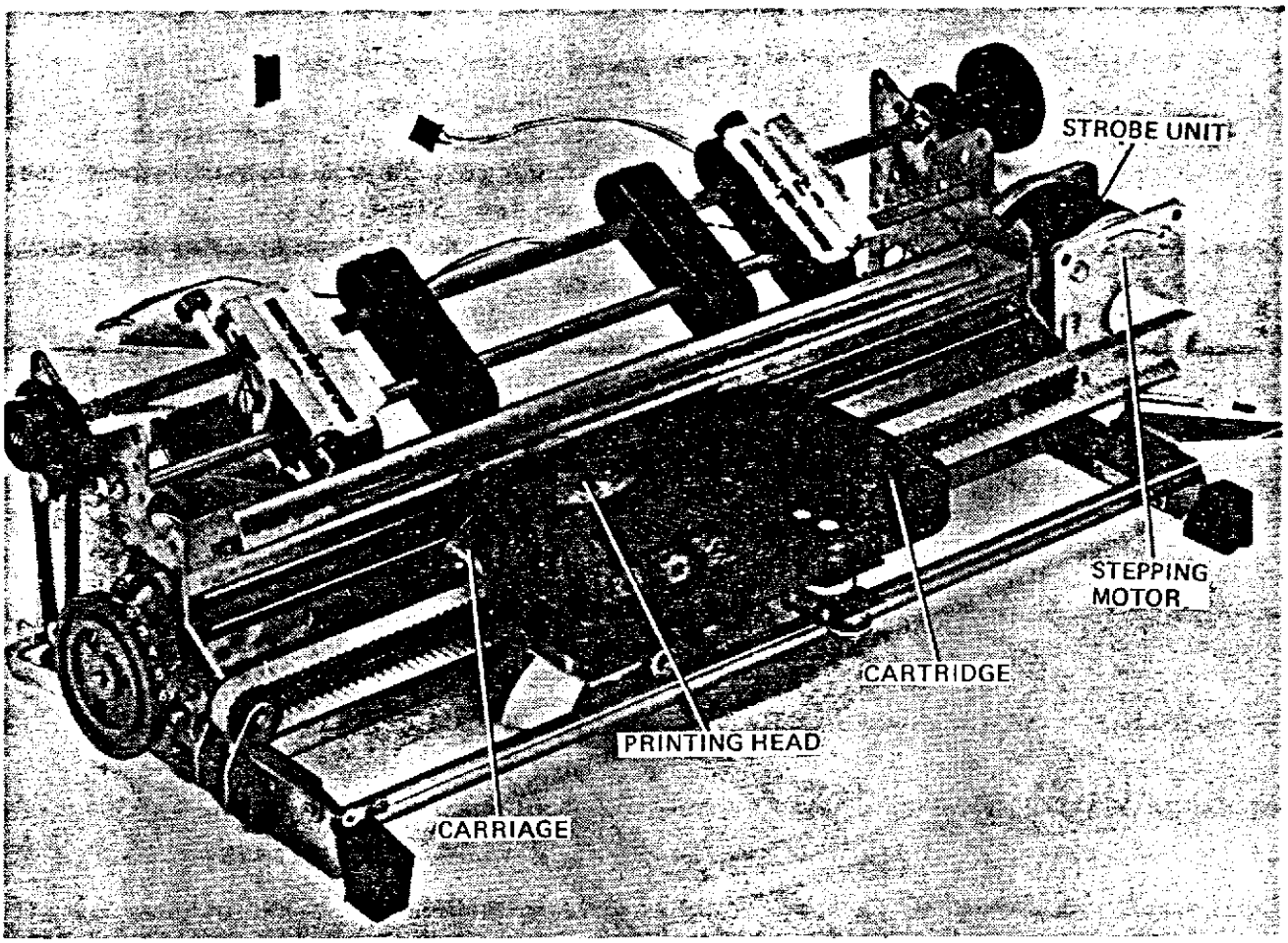

Figure 2-2 Printing Head Carriage

On the back of the stepping motor it is assembled the strobe unit consisting of a 200 slots disk, a photo-sensor and its stand.

The strobe disk operates according to the electronic logic and performs the following functions:

- speed control
- motor step count
- clearing the machine
- generation of printing strobe.

The carriage guides are two shafts, the back one is eccentric.
Characters are formed by the subsequent printing head

actions during its run along the printing line.

Printing Head

The PR 1350 printing head consists of 7 vertical needles moving in a ruby guide plate (max run = 0.6 mm). The needles are driven by coils, assembled on a single structure (see figure 2-1).

The printing head and its flexible cable can be easily disassembled from the carriage. The electromagnet armatures are soldered to the printing needles and attached to the backward springs which, at rest position, are lightly pre-loaded by the damping top (see figure 2-1).

Printing Technique

The printing is obtained by activating selectively the seven coils driving the printing needles.
The activating sequence of the coils is controlled by a proper microprogram, and a transcoding table, which converts the ISO codes in the corresponding printing matrices.
The transcoding table is included in the ROM (character generator).

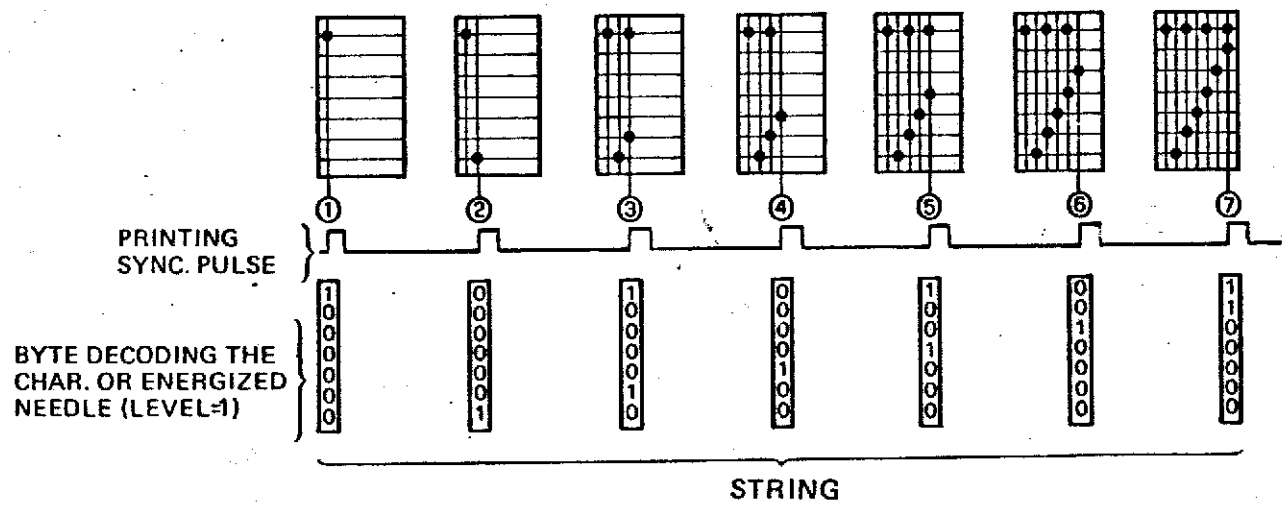

Figure 2-3 Printing Sequence of Character "7" by 7 x (4+3) Matrix

When receiving the pulses, the activated coils push the needles towards the ribbon and paper; the needle

impact causes the printed dots.
The character consists of a proper positioning of the dots in a rows-and-column matrix (see figure 2-3).

A 7 x (4+3) matrix is used (7 rows by 4 step columns with 3 half - step columns).

Each of the 4 columns is composed by 7 vertical dots; the printing is possible in the intermediate positions between the columns (half step) in order to obtain a better definition for the characters having diagonal or linked lines.
We have then 49 (7 x 7) possible positions, but only 28 can be printed (because two dots half-step away from each other can't be printed on the same line).

A printing step corresponds to 5 steps of the stepping motor: 4 for the columns and one for the character pitch.

No half step is used for elongated characters and the columns originate from the corresponding normal character columns (see figure 2-4).

The traditional rubber platen is not used in the PR 1350, in its place there is a fixed impact bar (see figure 2-1).
The printing impression adjustment, as a function of the number of copies to be printed, is carried out by varying the printing head distance from the impact bar by means of the eccentric shaft of the head carriage. The nearing mechanism consists of a positioning lever, attached to eccentric shaft, which displaces the carriage in 7 positions: the first 6 are printing positions (according to the number of copies), with a relative distance, between each other, of 0.07 mm, while the seventh position is used to move the printing head for paper feeding.

The PR 1350 printing head runs in both senses (left to right and vice-versa) along the printing line and prints the characters in sequence up to 132nd/220th position, or until an operating control (LF, VT, FF, CR) is received.

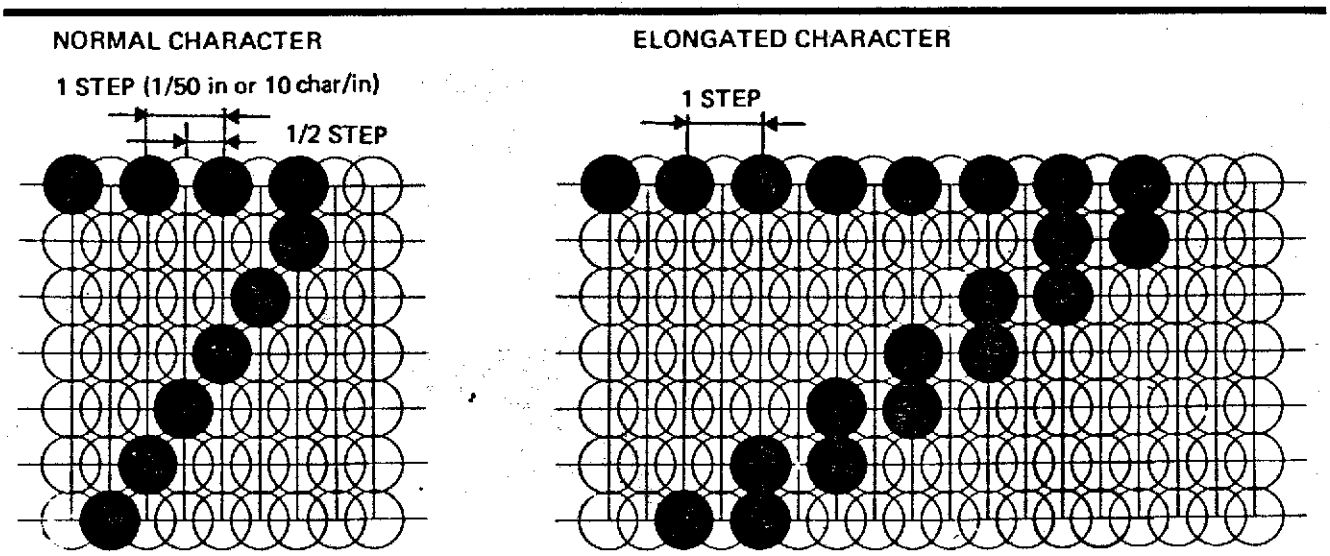

Figure 2-4 PR 1350 Character Formation

The printing head motion is controlled by an appropriate microprogram.
The microprogram sets the beginning and end position of data line to be printed according to the paper form and then selects the head motion direction.
The head motion direction is selected by the microprogram taking into account the actual printing head position with reference to the line position on the paper form, in order to get the minimum head run (optimized movement).
The printing is, therefore, performed in the direction requiring the minimum head run.

Figure 2-5 shows 5 cases of head run, from right to left or vice-versa, according to the head starting position.

In all cases shown, the characters to be printed are contained within the 28th and 68th position (10 char/in). The characters to the left and right of these positions are defined as space characters.
In the 1st case, the head starts at position 60.

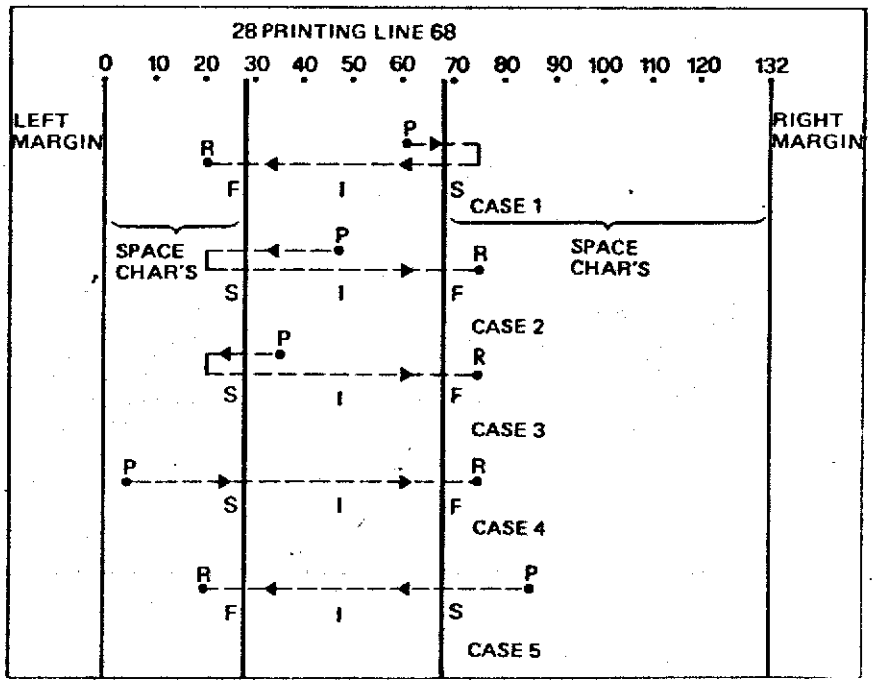

Figure 2-5 Examples of Optimized Printing Head Movement

Microprogram sets the printing procedure allowing the minimum head run; therefore it moves the head beyond position 68, then stops the head and inverts its running direction.

The printing begins from position 68 with the correct speed and the microprogram sends the characters in the right order for printing from right to left. Characters will be also exactly formed from right to left. Printing head will stop beyond position 28, after the printing ends at position 28.

The operation for other cases is analog to the above one, remembering that:

- letter P indicates the printing head position before beginning the printing sequence
- letter S marks the printing start point
- letter F marks the printing end point

- letter R marks the stop point of the printing head.

The maximum buffer loading time at the end of line (it can occur during the line space) is about 150 ms, for 10 char/in; the average printing rate, expressed in lines per minute (for 10 char/in) is:

- 58 lpm for 80 character full lines
- 38 lpm for 132 character full lines.

Figure 2-6 shows the PR 1350 throughput (lines per minute depending on the number of characters per line).

The diagram gives the PR 1350 productivity as function of the line length, for bidirectional printing.

The characters are considered left-hand aligned without taking into account the optimized movements and the higher head speed along the no-print stretches.

Set of Characters

The following sets of characters are available:

- 96 characters: set of ISO alphabet according to national versions

- 96 characters: Latin-Katakana reduced version

- 128 characters: Latin-Katakana standard version.

The national versions are:

- GERMANY	-	96 characters	- CRT 025
- ITALY	-	96 characters	- CRT 026
- USASCII	-	96 characters	- CRT 027
- PORTUGAL	-	96 characters	- CRT 028
- SWEDEN-FINLAND	-	96 characters	- CRT 029
- GREAT BRITAIN	-	96 characters	- CRT 030
- FRANCE	-	96 characters	- CRT 031
- SPAIN	-	96 characters	- CRT 032
- JAPAN	-	96 characters	- CRT 033
- JAPAN	-	128 characters	- CRT 034
- DENMARK	-	96 characters	- CRT 038
- JUGOSLAVIA	-	96 characters	- CRT 039
- GREECE	-	96 characters	- CRT 040
- USSR	-	96 characters	- CRT 041
- ISRAEL	-	96 characters	- CRT 042

- letter R marks the stop point of the printing head.

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- ISRAEL	-	96 characters	- CRT 042

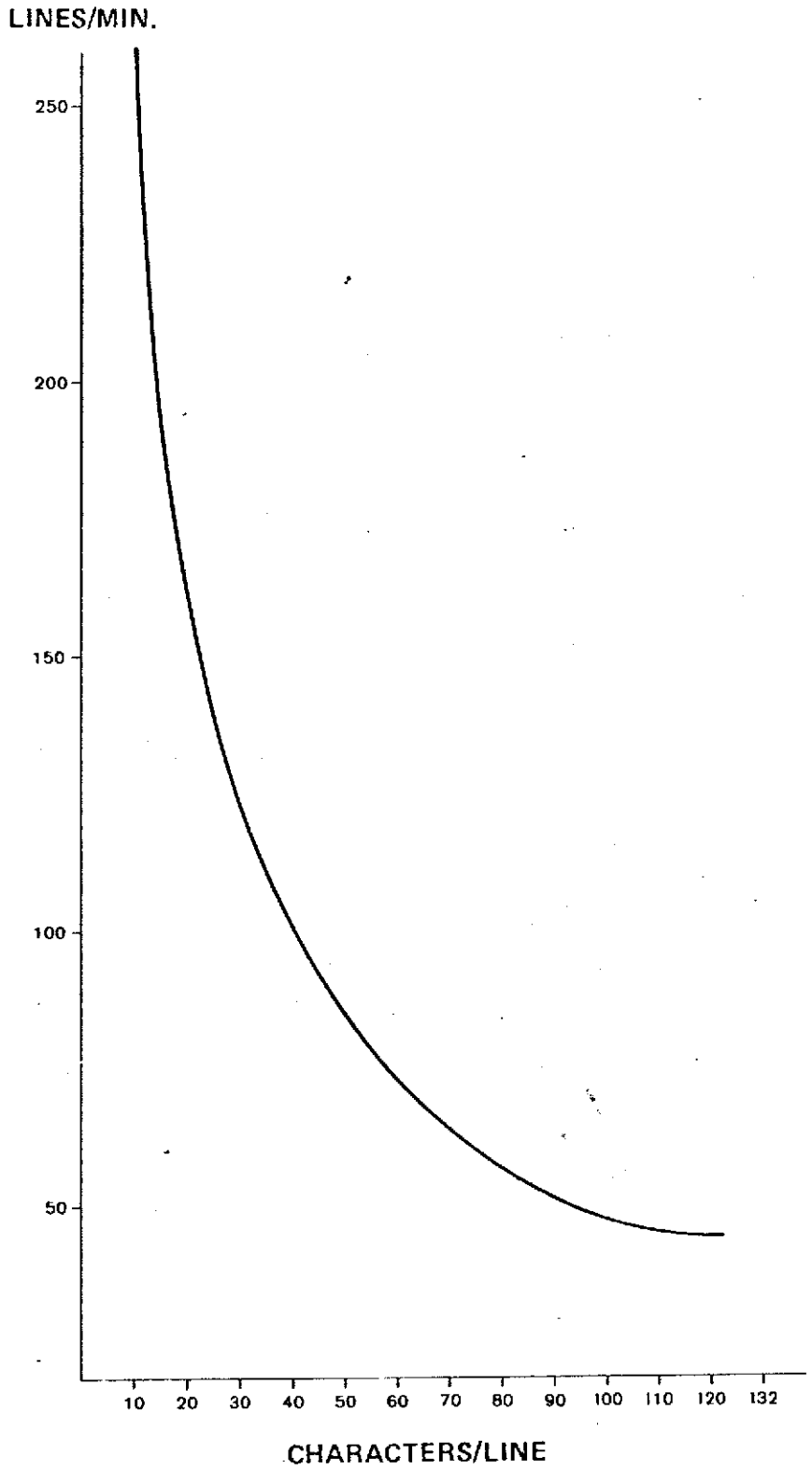

Figure 2-6 PR 1350 Throughput

Other printing versions are available only on specific request.

Characters SP (space) and DEL (clearing control) of ISO set are not printed.

All characters not included in the set are printed as " ||| ".

The print of these characters can be optionally suppressed and the text packed.

The table in figure 2-7 gives the ISO-USASCII character set.
The control codes for all the character sets are located always in the first two columns. 12 special characters can be added to the set, on request.
The locations where these twelve characters will be housed are marked by a vertical line.

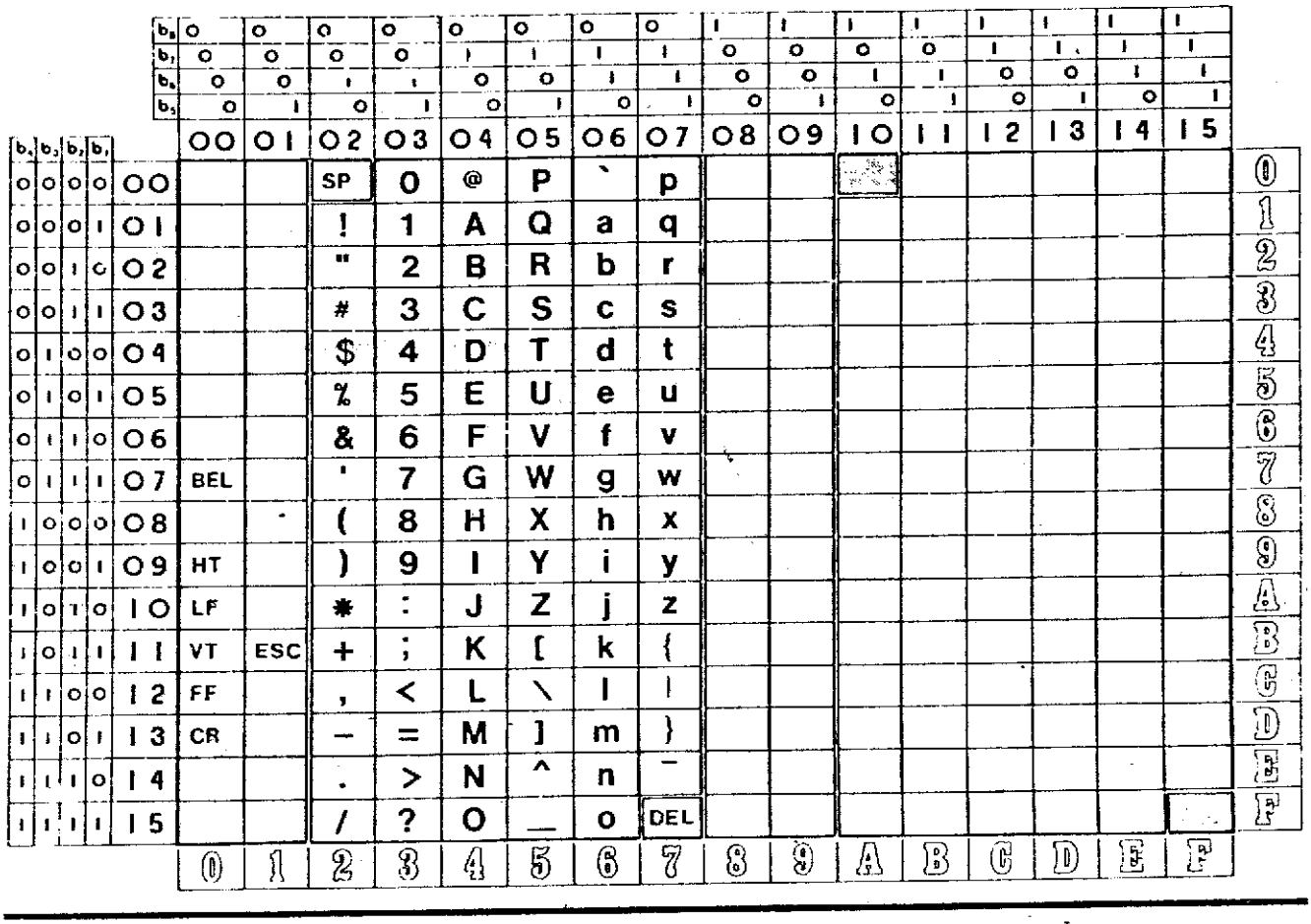

Figure 2-7 Table of ISO Coding (USASCII-CRT 027 version), 8-bit Extended

Automatic Printing

This performance is obtained with an LF command, automatically generated, each time the line buffer capacity is exceeded. In this way it is possible to print a complete multiline text without sending an operating command at every end of line.

When operating with automatic printing, the C.U.remains engaged by the peripheral unit until the end of printing.

Elongated Printing

The PR 1350 printer is capable of printing elongated characters i.e.: double character width, as shown in the following example:

THE OLIVETTI PR 1350 PRINTER
PRINTS AT THE RATE OF 90 CHARACTERS PER SECOND

The line capacity is 132 characters with printing pitch of 2.54 mm.
and 66 char. with ELONGATED CHR.

The line capacity is 220 characters with printing pitch of 1.53 mm
and 110 characters with ELONGATED CHARACTERS.

Elongated printing, always referred to a whole line, is obtained by inserting, between the 1st and 66th character (1/10 in pitch) or the 110th character (1/16.6 in pitch), the HT presetting control, or by inserting the ESC 3 presetting control at the beginning of the line. Automatic printing is possible in elongated printing mode too, when the line buffer capacity is exceeded (line capacity is halved: 66 and 110 char/line respectively).

ESC 3 elongated printing control is used for multiline texts, since it is valid until a clear code (ESC 4) or pitch change code (ESC >, ESC <) is sent. "Elongated printing ON" control (ESC 3) can be inserted at the beginning of a line only and is valid for the whole line and for the subsequent ones until the preset is cleared; "Elongated printing OFF" control (ESC 4) is put at the beginning of the line following the last one printed in elongated printing.

Elongated printing is never available at the switch on of the printer.

3. PAPER SERVICES

Paper services are composed by a sprocket feeding unit and a photosensor reading the punched tape loop on which the paper skips are programmed (see figures 3-1 and 3-2).

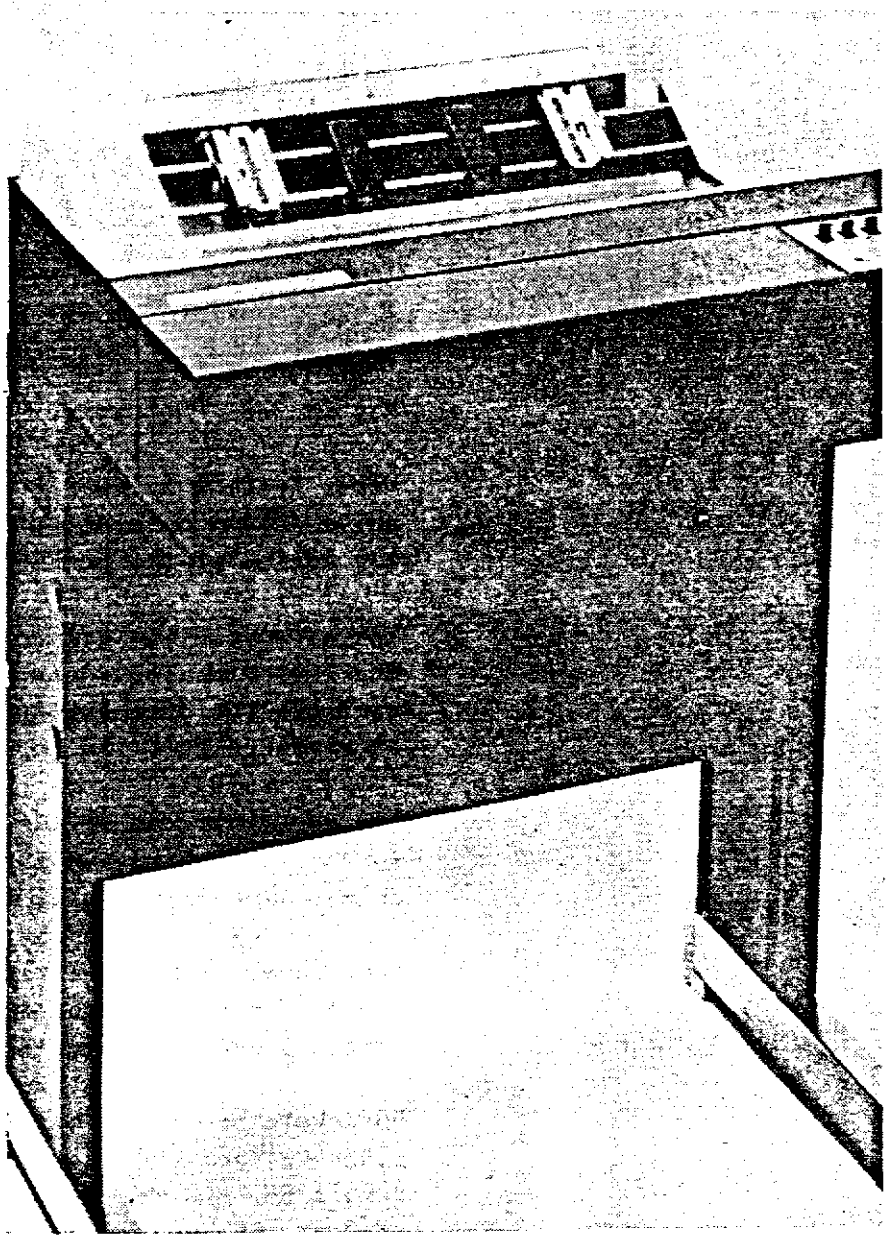

Figure 3-1 Paper Sprocket Feeder

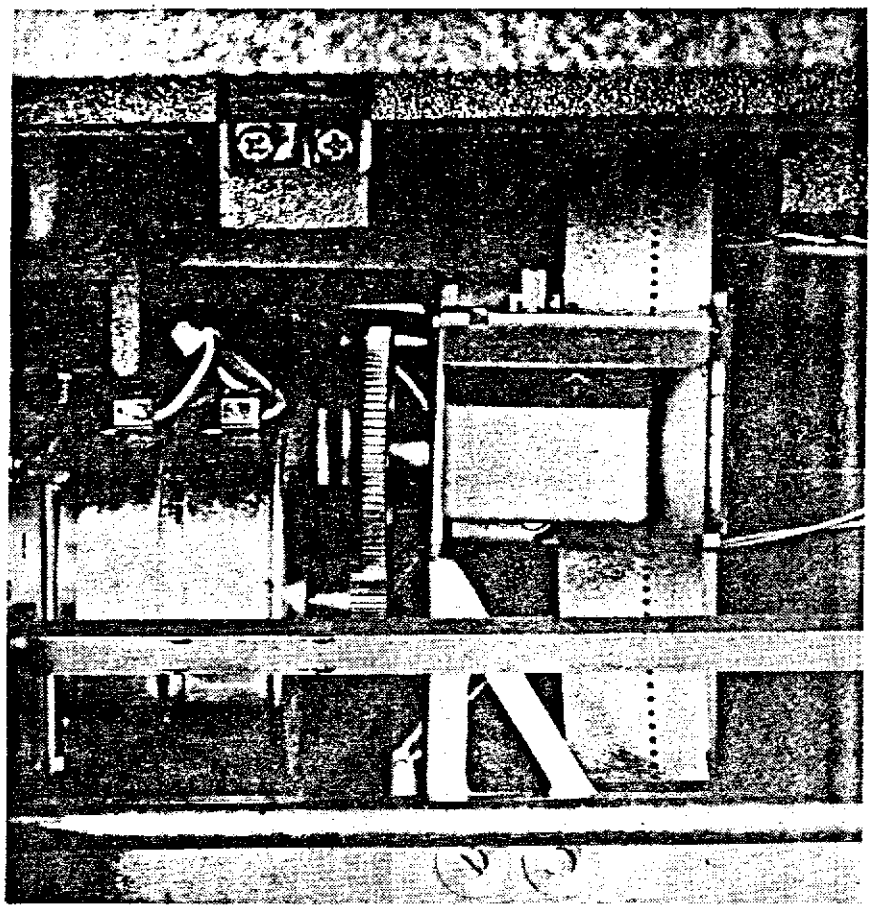

Figure 3-2 Photosensor Unit for Punched Tape Loop

Paper feeding is carried out by two matched sprocket units driven by a stepping motor, which also controls the motion of the punched tape loop.

The sprockets are driven by means of a square bar. On the latter it also has been mounted a rack clutch which controls the disengaging of the sprocket when a manual adjustment of the paper is required.

The sprockets are of the "track type", with pins mounted on a cog belt, and they can be moved sideways as to permit paper setting according to width.

Some paper stands are also mounted on the bar between the two sprockets. These stands can also be moved sideways according to the width of the paper.

Sprockets are drawn back with respect to printing plane to increase the paper adhesion to the print impact bar and for assembling the MFF (manual front feeder). The paper guide is brakeless to allow the card feed into MFF.

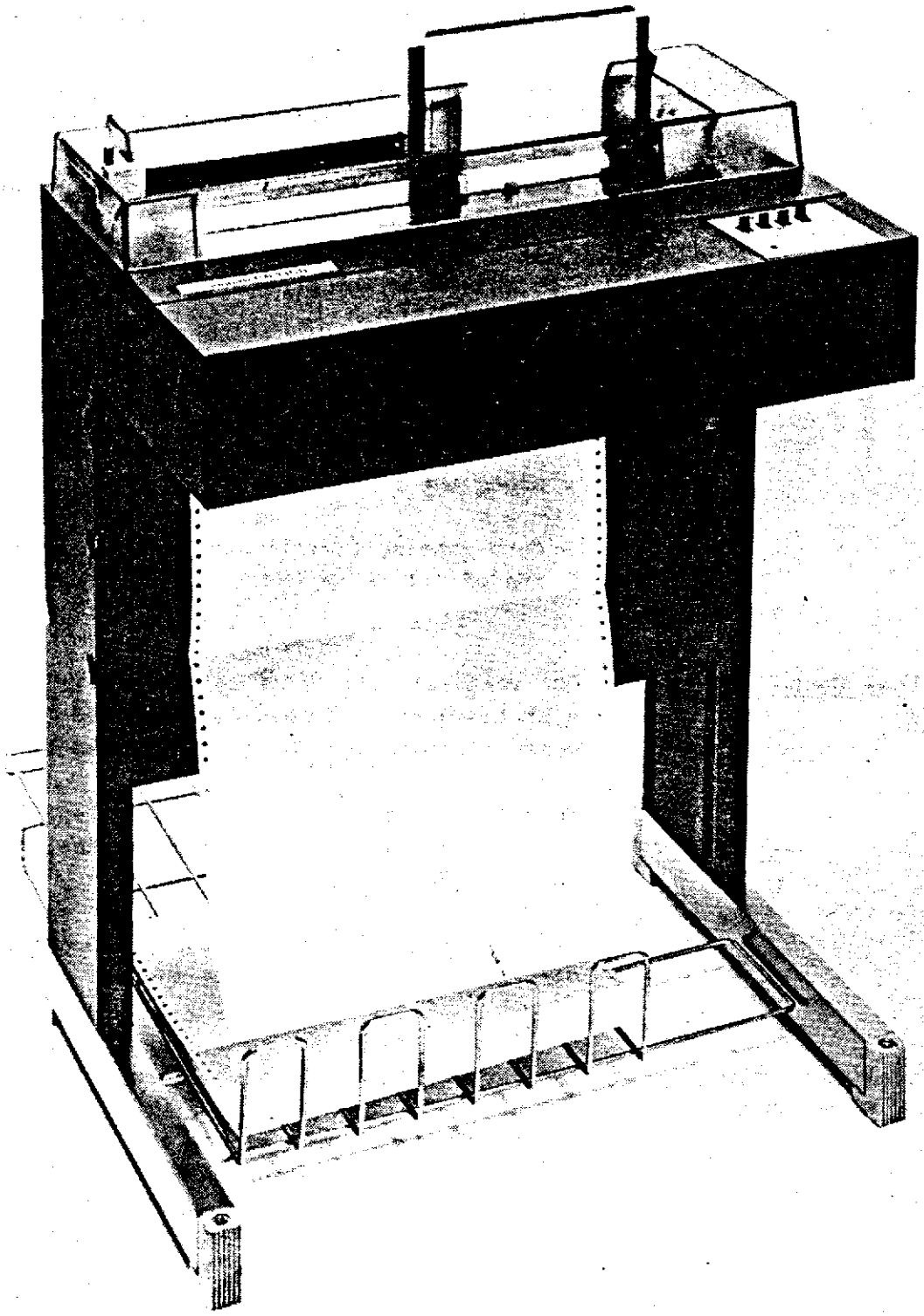

Figure 3-3 Paper Feed for PR 1350 and Card Feed into MFF 4806

Fan-fold paper forms punched on the margins are always fed from the bottom on the front and are recovered in the back of the printer (see figure 3-3).

Optional MFF opening is wide angled (90°) in order to make easier the paper insertion on the sprockets. No closed MFF and card present detections are provided because the wide rotation is sufficient to see the open and closed positions; if in open position a card is eventually present, no interference occurs with the printing head.

The movements the paper feed device can carry out are:

- line space (one at a time)
- vertical tabulation (continuous vertical movement, along the paper format)
- form phasing (continuous vertical movement, up to top of following format).

Vertical Control of the Format

The vertical control of the format is carried-out by a photosensor unit reading a punched tape loop on which the paper skips are programmed (see figure 3-2).

This device is controlled by the stepping motor, and it is composed by a unit dragging the paper tape and an optical reader.

Two phototransistors read the punched tape along the direction in which the tape moves.

Vertical Tabulation, Top of Form, Bottom of Form

The vertical control of the format includes:

- vertical tabulation within the format: it begins when a VT operating command is received by the printer from the central unit and is stopped when a hole punched on the 5th loop track is detected by the optical reader
- top of form: it begins when a FF operating command is received by the printer from the central unit and is stopped when a hole punched on the 7th loop track is detected by the optical reader

- bottom of form: it begins when holes punched on 5th and 7th tracks are contemporaneously detected and is stopped when a hole punched on the 7th loop track is detected.

Punched Tape Loop

Characteristics of punched tape loop containing the paper skip program are:

- width: 25.4 mm (1 in)

- length: variable from 183 mm (7.2 in) to 304.8 mm (12 in) corresponding to 72 and 120 line spaces respectively.

  These lengths are suitable for the following kinds of formats:

  . 3 in or 6 in or 12 in (Europe)
  . 5 1/2 in or 11 in (USA).

  If the line spaces of the format are less than the line spaces present in the minimum length loop (72), the same punched program sequence is to be repeated more times on the loop.

  To each line space (4.23 mm) on the format coresponds one punching pitch (2.54 mm) of the loop.

  The loop length is therefore given by the equation:

  $L = n \times 2.54$

  where L is the length expressed in mm and n are the line spaces of the format or multiples

- punched tracks: 8

- punching pitch: 2.54 mm (0.1 in)

- traction track: between tracks 3 and 4.

The material to be used for the loop tape is metal-mylar or Olivetti blue-mylar (code 3847278 V).

The programming holes must be punched on the tape in the correct sequence, taking into account that the direction in which the loop rotates is inverse to the direction in which paper advances.

Figures 3-4, 3-5, 3-6 give a programming example for:

- vertical tabulation
- top of form
- bottom of form.

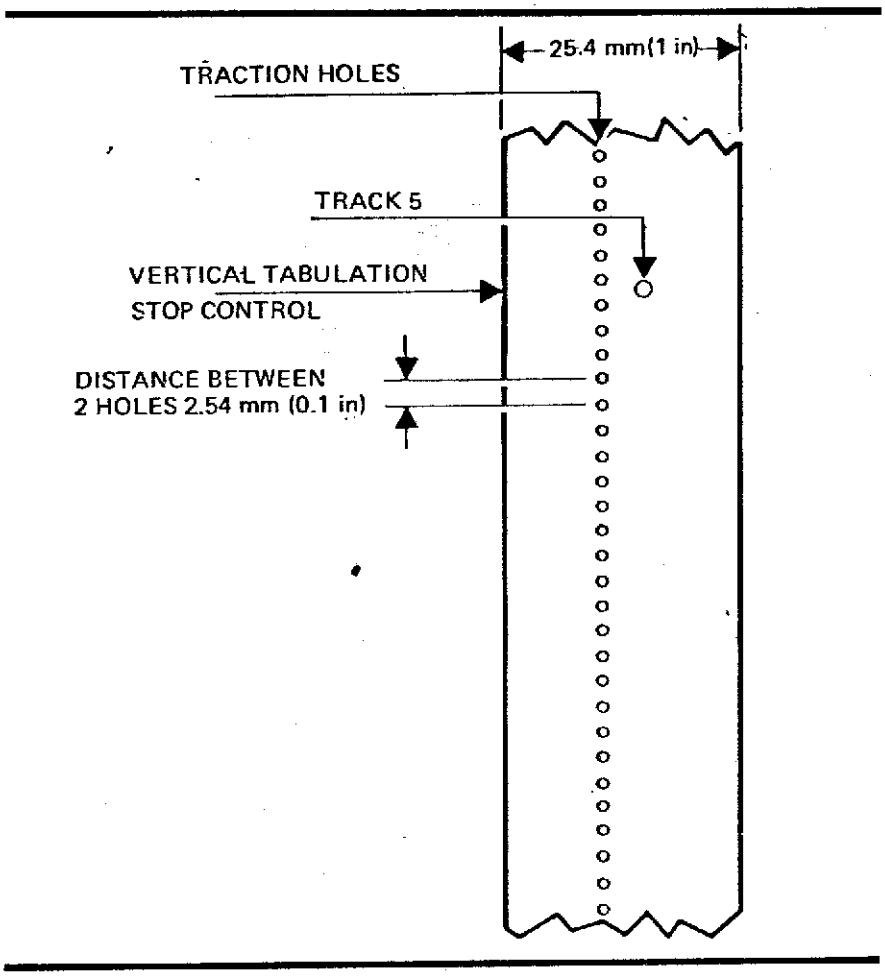

Figure 3-4 Example of Punched Tape Loop with Stop Control of Vertical Tabulation

The example of figure 3-4 shows that only track 5 has been punched therefore the vertical tabulation has been programmed.

Any character whose coding contains bit 1 on track 5, but not 7, will activate the stop command of VT.

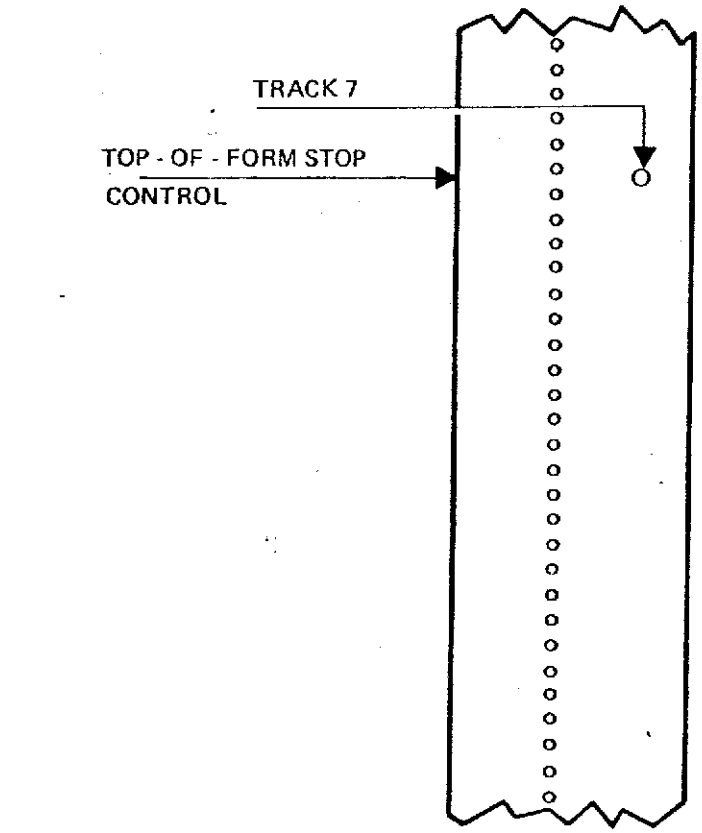

Figure 3-5 Example of Punched Tape Loop with Stop Control at Top of Form

In the above example only track 7 has been punched, therefore the stop at top of form has been programmed.

Any character whose coding contains bit 1 on track 7 but not 5, will activate the command of stop at top of form.

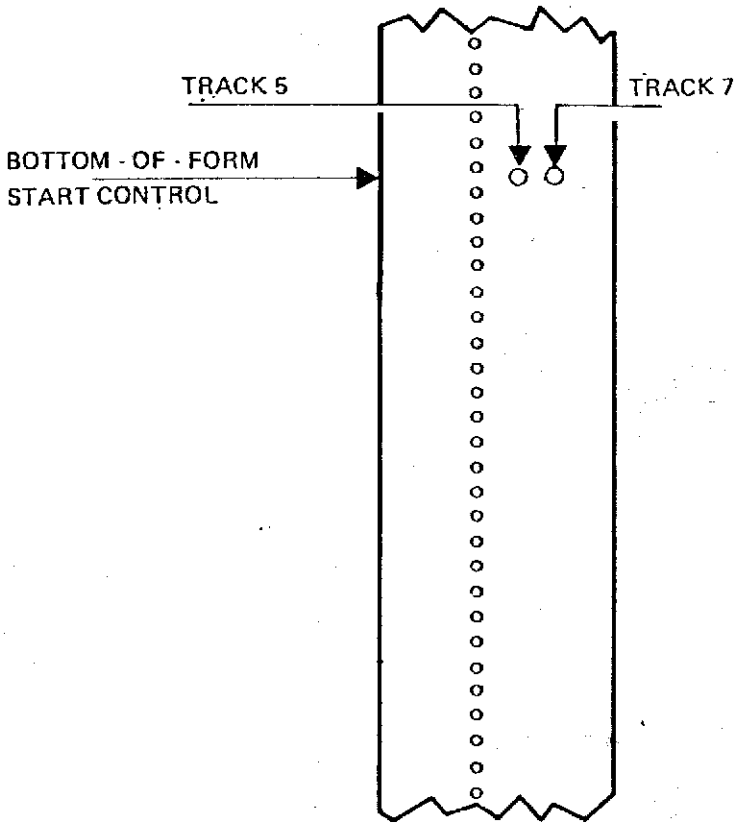

Figure 3-6 Example of Punched Tape Loop with Start Control of End of Form

Both tracks 5 and 7 are punched in the above example, therefore the start control of bottom of form skip has been programmed.
Any character whose coding contains bit 1 on the tracks 5 and 7 will activate the start command of bottom of form skip.

Preparation of the Loop

Follow the procedure below, when preparing the loop:

1. Cut the two ends of the tape at a distance of 2.5 holes from the last skip control. That means to cut the tape exactly in the middle of the 3rd traction hole after the last skip control (see figure 3-7).

2. Join the two ends together with adhesive tape, by superimposing the skip controls of both ends on each other, so that a single control is obtained.

Obviously this superimposing must be taken into account when punching the loop.

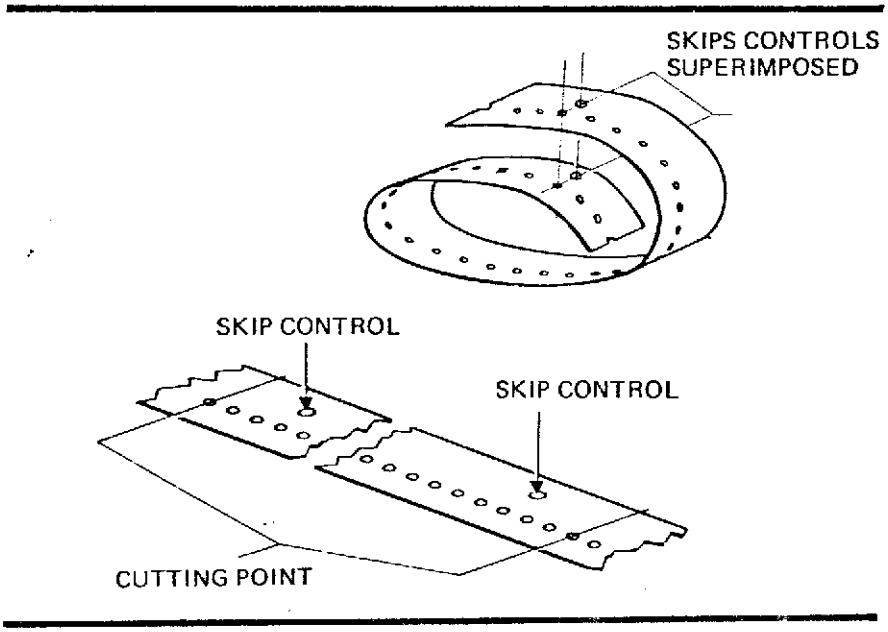

Figure 3-7 Loop Preparation

Printer Operation without Loop

If the loop has not been inserted or is broken, the printer carries out the following sequence of operations:

- the data received is loaded in the buffer
- it prints the buffer contents
- executes 120 line spaces
- goes in LOCAL
- maintains the console enabled.

To clear the condition it is necessary:

- to insert the loop
- to execute at least one line space (LF control switch on console)
- to remove the LOCAL condition (LOCAL-AUTOM control switch on console).

4. RIBBON SERVICES

Only MATRIXCART ribbon cartridge is to be used (see figure 4-1).

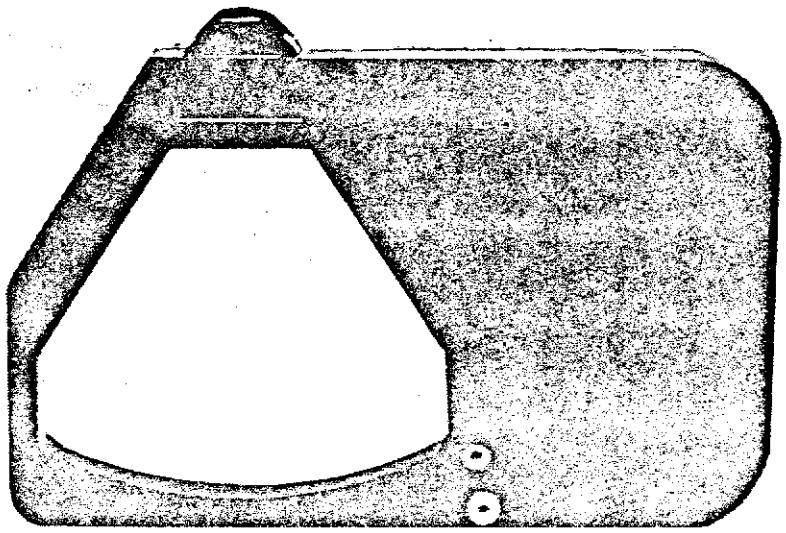

Figure 4-1 MATRIXCART Ribbon Cartridge

This cartridge includes a Mobius-ring ribbon loop (folded into the cartridge) allowing the use on both sides, without requiring the inversion of ribbon motion.

The ribbon loop motion is obtained through a reducer driven by two wires streched between the sides of the machine.
Two idle wheels fixed on the head carriage, put in rotation by the tight wires during the head carriage movement, transfer the motion, in a costant direction to the reducer (see figure 4-2).
One of these wheels is engaged during the forward travel of the head carriage housing the MATRIXCART cartridge, while the second wheel is engaged during carriage return.

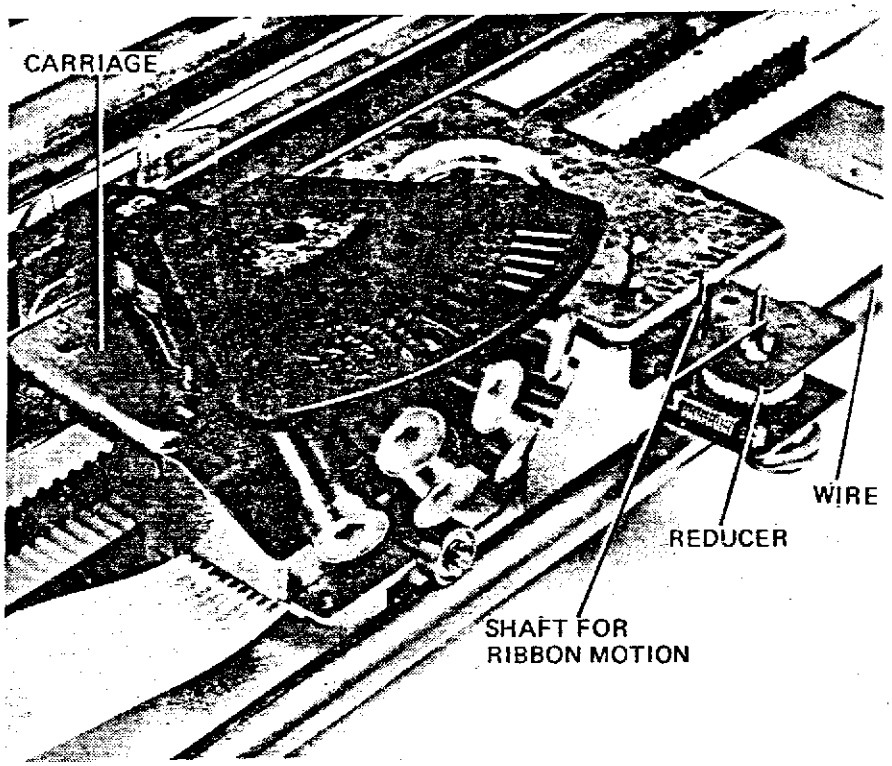

Figure 4-2 Ribbon Movement Device

Therefore the ribbon moves always in the same direction, at each shifting of the printing device.

5. VARIOUS DEVICES

End-of-Paper Detection

A microswitch checks the presence of the continuous paper form, for the purpose of signalling the "end-of-paper" condition.
This detection occurs at about 7 line spaces before the end of the continous paper form.

When the microswitch is activated, and the optional jumper 4 "signalling the end-of-paper for setting the peripheral in LOCAL" is present, PR 1350 switches to the LOCAL status.
The characters contained in the printing buffer at the end of paper are nevertheless printed.

Open-Cover Detection

The opening of the front cover is detected by a micro-switch.

Opening the cover while the head is moving sets the PR 1350 in "out of service" status.
At cover opening, the printing head stops and it returns to the beginning of the line at cover closing. The line buffer contents are lost and electronic circuits are cleared.

Graduated Scale

A double graduated scale (for 1.53 and 2.54 mm) is provided for the manual setting of the forms or of the card (with MFF) at an exact position along the maximum-length line (132 or 220 characters).

Fan for Printing Head

The fan, used to cool the printing head, is placed on the bottom panel of the mechanical housing.

6. IPSO INTERFACE

The PR 1350 printer is equipped with IPSO interface which allows the connection of any Olivetti Central Unit (C.U.) equipped with an IPSO channel. The connection can be executed either directly or through a typical IPSO daisy chain (the printer therefore has 2 IPSO connectors). The printer operations entirely depend on the exchange of signals carried out with the connected central unit.

Input - Output Signals

The IPSO interface signals used by the PR 1350 printer are the following (UC = output signals from C.U., UP = input signals from P.U. - peripheral unit):

- (UCAN) - PERIPHERAL UNIT SELECTION (1 channel): indicates the selection phase, which can be avoided if the optional jumper 3 is set (see page 1-7)

- (UCA1 - UCA4) - TEST CONTROL (4 channels): when P.U. selection occurs (UCAN), UCA1 - UCA4 channels can carry a test control; two status conditions can be checked issuing test controls on UCA1 - UCA4 channels:

  . "end of paper", issuing a test control with binary value from 8 to 11

  . "printer busy", issuing a test control with binary value from 12 to 15

- (UCA5 - UCA8) - PERIPHERAL UNIT ADDRESS CODES (4 channels): when P.U. selection occurs (UCAN), UCA5 - UCA8 channels can carry the PR 1350 select address code; the PR 1350 address code is set on the PR 1350 by means of 4 address jumpers (on STAB2 board) which can give up to 16 address combinations

- (UCAD) - DATA EXCHANGE DIRECTION (1 channel): indicates the direction of the dialogue (UCAD at Ø = ouput)

- (UCA1 - UCA8) - OUTPUT DATA (8 channels): this is a 8 bit output (BUS) on which output data, during data exchange, are present; it carries the character codes in bit parallel, byte serial form

- (UCAP) - CENTRAL UNIT READY (1 channel): indicates that the central unit is ready to exchange data

- (UPAP) - PERIPHERAL UNIT READY (1 channel): indicates that the printer is ready to exchange data

- (UPAC) - CHARACTER REQUEST (1 channel): this signal is used as a request to transfer each output data character

- (UCAC) - CHARACTER REPLY (1 channel): this signal is used as a reply to send each output data character

- (UPAM) - PERIPHERAL UNIT IN LOCAL CONDITION (1 channel): indicates that the printer is in local condition and a manual intervention is required; when the printer is in local condition, the light indicator LOCAL, on the console, is lit, if the optional jumper 6 is set (see page 1-7); this happens in the following cases:

  . at the printer switch-on (the LOCAL indicator is lit for a moment and then it is switched-off automatically)

  . after pressing the LOCAL switch, on console

  . when the printer receives the preset control BEL from the C.U. and if the performance has been programmed

  . after the microswitch "end of paper" has been activated, if the optional jumper 4 is set (see page 1-7)

  . when the punched tape loop is not present or it is broken (see page 3-9).

During LOCAL condition, the console control switches are operative but the characters request is not inhibited.

- (UPAD) - PERIPHERAL UNIT STATUS CONDITIONS (1 channel): this is the multiplexed status bit ("end-of-paper" or "PR 1350 busy") returned to the C.U., and it is selected by the code on UCA1 - UCA4 when a test control is issued (see TEST CONTROL)

- (UCAS) - SYSTEM RESET (1 channel): indicates that the C.U. unaddresses the PR 1350 and sets the printer in LOCAL condition

- (UPAS) - PERIPHERAL UNIT OUT OF SERVICE (1 channel): indicates that the printer is set in out of service condition or it is not present; the following cases cause PR 1350 to be out of service:

  . power off or voltage failure

  . at printer switching-on until the mechanic unit has terminated the initial cycle for correct setting

  . after cover opening (see page 1-4).

Dialogue Procedures in Automatic Operating Mode

When the printer is switched on, the printing head moves automatically to the extreme left edge of the printable paper width; the LOCAL light indicator is lit for a moment and then it is switched-off automatically (if the optional jumper 6 is set). The printer is now ready to dialogue with the C.U. to which it is connected (automatic dialogue).

In order to be consistent with the IPSO interface logic, it is necessary to address the peripheral unit selected as well as the relevant function to be carried out. This selection is carried out by the C.U. connected to the printer by sending the PR 1350 address code (UCA5 - UCA8) corresponding to the address set on the PR 1350. If the optional jumper 3 is set, the printer can be selected by all the 16 select address combinations instead of requiring one specific select address code.

When the address received from the C.U. corresponds to the address set on the selected PR 1350, and if there are no anomalies or the PR 1350 is not "busy", the selected printer sends the interface signal (UPAP) which means that it is ready to exchange data.

The PR 1350 printers are peripheral units that carry out the characters request (obviously, when the IPSO rules are met and when the printers are not "busy").

Characters are always transferred when the printing head carriage is not moving; but their transfer can overlap the paper movement (line feed or form feed). The transfer rate is 1,000 char/s; it can reach 1.800 char/s, if the optional jumper 1 is set and if data are not transferred simultaneoulsy with the paper movement (in this case the transfer rate during the paper movement will be 1,000 char/s and it will reach 1,800 char/s when paper movement stops).

The PR 1350 printer is equipped with a storage buffer whose capacity is:

- 132 characters, at 10 char/in printing pitch
- 220 characters, at 16 char/in printing pitch.

After storing the message to be printed, the printer sets the "busy" status condition and does not send the characters request until it remains in this condition.

As soon as one operating control (LF, VT, FF, CR) is received in the data stream, the message stored in the buffer is printed. After the operating control received is executed, the printer still sends the characters request, allowing the connected central unit to perform the "end of data transfer" sequence (the PR 1350 never carries out this sequence). The "end of data transfer" sequence from C.U. inhibits any additional character requests from the PR 1350; but, if the C.U. does not perform the "end of data transfer" sequence or re-activates the characters request after it, then the PR 1350 can exchange only one data and no more characters request are sent to the C.U. The only data transferred remains stored in the buffer. As a result, and according to the IPSO rules provided for this type of conditions, the C.U. is slaved directly to the PR 1350 operations rate.

The PR 1350 continues the data exchange:

- after printing accomplishment if the only data transferred is a character code; the dialogue then continues normally until the transferred data are

character codes; the dialogue stops again (no more characters request from PR 1350) at the end of a control code transfer (this code remains stored in the buffer); the C.U. is slaved again to the paper movement accomplishment

- after mechanical operations accomplishment if the only data transferred is a control code.

To optimize the C.U. transmitting times and to avoid the above mentioned C.U. waiting times, the C.U. must transmit messages with a number of characters not exceeding the maximum printing line length (this is reduced to half in elongated printing) and only one operating control; after the last data the C.U. must send the "end of data transfer" sequence. The C.U. must check the status condition of the PR 1350 (on UPAD for "PR 1350 busy" - see page 6-3) before sending the next message. Only when the PR 1350 is not busy, the C.U. will exchange the new message.

Dialogue Procedures in Local Operating Mode

When the printer is set in LOCAL operating mode this is indicated by the PR 1350 in LOCAL condition input signal (UPAM). Even when the printer is in LOCAL condition it continues sending the characters request and it is ready to receive and print messages.
The dialogue must be stopped (when the last message is printed) by the central unit. Therefore the C.U. must be programmed to check the P.U. in LOCAL condition input signal (UPAM) before sending a message, so to avoid messages to be sent when the PR 1350 is in LOCAL operating mode.

The PR 1350 operator, also when the PR 1350 is in LOCAL condition, must not open the cover before the C.U. has stopped the dialogue and the last message has been printed. If the cover is opened while the printing head is still moving the printer is set in out of service (UPAS). When the printer is set in out of service while it is printing, any running operation is interrupted; in particular, if the printing head is printing, it stops immediately its printing movement; the printer restarts operating only when the cover is closed again (see page 5-1).

If the C.U., after correct cover opening, and with the printer still in LOCAL condition, sends a mes-

character codes; the dialogue stops again (no more characters request from PR 1350) at the end of a control code transfer (this code remains stored in the buffer); the C.U. is slaved again to the paper movement accomplishment

- after mechanical operations accomplishment if the only data transferred is a control code.

To optimize the C.U. transmitting times and to avoid the above mentioned C.U. waiting times, the C.U. must transmit messages with a number of characters not exceeding the maximum printing line length (this is reduced to half in elongated printing) and only one operating control; after the last data the C.U. must send the "end of data transfer" sequence. The C.U. must check the status condition of the PR 1350 (on UPAD for "PR 1350 busy" - see page 6-3) before sending the next message. Only when the PR 1350 is not busy, the C.U. will exchange the new message.

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The PR 1350 operator, also when the PR 1350 is in LOCAL condition, must not open the cover before the C.U. has stopped the dialogue and the last message has been printed. If the cover is opened while the printing head is still moving the printer is set in out of service (UPAS). When the printer is set in out of service while it is printing, any running operation is interrupted; in particular, if the printing head is printing, it stops immediately its printing movement; the printer restarts operating only when the cover is closed again (see page 5-1).

If the C.U., after correct cover opening, and with the printer still in LOCAL condition, sends a mes-

sage, the PR 1350 is set in out of service condition and does not execute any operating control.

The console control switches are enabled only when the PR 1350 is in LOCAL condition and the running operations have been completed.

7. PROGRAMMING CODES

The programming codes used in the PR 1350 printer are the operating, clearing, preset and test controls codes described in this chapter.

PR 1350 operating, clearing and preset control codes are sent with the data by the CU; they don't occupy any space in the line buffer and are integral part of the ISO character set (see figure 2-7 for their binary coding).

The test controls codes can check two status conditions of the PR 1350 printer and are sent by the C.U. on UCA1 - UCA4 IPSO channels (status bit is returned to C.U. on UPAD IPSO channel).

Operating Control Codes

These controls, sent with the data by the C.U., as soon as they are acknowledged by the PR 1350, cause the printing of the line buffer contents (if it contains at least one character) and the command execution, in sequence.

The operating controls which the printing unit is capable to carry out are:

- LF - line space
- VT - vertical tabulation
- FF - form feed
- CR - carriage return.

The operating commands referred to paper skip (VT,FF) are controlled by a programmed 8-tracks tape loop which uses only tracks 5 (vertical tabulation) and 7 (skip over top of form).

In fact the paper feed starts on VT and FF operating controls and stops when signals from tracks 5 or 7 of the punched tape loop are received.

The skip of the end of form can be controlled by the

loop if tracks 5 and 7 are simultaneously punched. In this case the paper feed starts when the simultaneous signals of tracks 5 and 7 are received and stops at subsequent 7th - track signal (stop at top of following form).

This performance (bottom of form) is particularly useful to avoid the print on folded or pre-cut areas of the paper forms with loss of information when the paper is removed.

Clearing Control Codes

These controls, sent by the central unit together with the data, as soon as they are acknowledged by the PR 1350, cause the command execution.

The commands are:

- DEL
  cancels the received data (the line is cancelled even if DEL character is at 133rd or 221st position)

- ESC Ø
  (bicharacter control); it re-initializes the peripheral unit (general clear).

Preset Control Codes

These controls, sent by the CU together with the data, preset the printer operations as follows:

- BEL
  controls the printer switching to LOCAL condition, with optical signal on operating console, if so programmed; optionally it can also drive the acoustic signal; if mechanical operations are in program, they are correctly completed

- HT
  elongated printing; this control is accepted if the transmitted data don't exceed the capacity of half buffer (66 char at 10 char/in or 110 char at 16.6 char/in); if the capacity is exceeded the command is ignored; the control is valid only for the line including it

- ESC < (bicharacter control)
  presets the 10 char/in pitch; it is ignored if the 16.6 char/in pitch has been preset by console

- ESC > (bicharacter control)
  presets the 16.6 char/in pitch

- ESC 3 (bicharacter control)
  allows elongated printing for all the characters until ESC 4 control is received

- ESC 4 (bicharacter control)
  normal printing; it clears ESC 3 control.

The above 4 bicharacter controls must be put at the beginning of the data. If not, they are not acknowledged and the two characters are considered as an unknown character and printed as ||| , unless the printer has the option of printing exclusion of unknown characters.

Equally if the character following ESC is not one of the series (Ø, >, <, 3, 4), the command is ignored and will be considered an unknown character.

Other ISO controls, not belonging to the printer set, are ineffective and are considered as unknown characters.

Test Control Codes

The "local" and "out of service" status conditions of the printer are indicated on the IPSO channels UPAM and UPAS respectively. They are tested directly by the central unit. But, both the "end of paper" and "PR 1350 busy" status conditions are indicated on the same IPSO channel, UPAD, and are tested selectively by the C.U. when one of the following test control codes is issued (see page 6-3):

CODE				TEST CONTROL
2^3 (UCA4)	2^2 (UCA3)	2^1 (UCA2)	2^0 (UCA1)	
1	0	0	0	END OF PAPER
1	0	0	1	END OF PAPER
1	0	1	0	END OF PAPER
1	0	1	1	END OF PAPER
1	1	0	0	PR 1350 BUSY
1	1	0	1	PR 1350 BUSY
1	1	1	0	PR 1350 BUSY
1	1	1	1	PR 1350 BUSY

8. PROGRAMMING PROCEDURES

The PR 1350 printer is handled by:

- a set of programming instructions given to the control unit of the connected central unit (transmit data message, transmit test control for end of paper, transmit test control for PR 1350 busy)

- a set of operating controls inserted in the data message to be printed (LF, VT, FF, CR)

- a set of clearing and preset controls also inserted in the data message to be printed (DEL, ESC Ø, BEL, ESC >, ESC <, ESC 3, ESC 4, HT).

The operating controls are inserted at the end of each data message to be printed. The clearing controls as well as the BEL preset control are always accepted disregarding the position in which they are inserted in the data stream. The HT preset control is inserted between the first and 66th character (or 110th, at 16.6 char/in printing pitch); in other words the HT control is accepted only if the transmitted characters have not yet exceeded half the buffer capacity, otherwise it is ignored. The bicharacter preset controls (ESC >, ESC <, ESC 3, ESC 4) are inserted at the beginning of the data message, otherwise they are ignored.

To handle the PR 1350 printer suitable sequences will be inserted in the application program of the connected system. The various applications for which the PR 1350 printer may be used can involve different handler program sequences. The standard programming flow illustrated in figure 8-1 must not be considered as mandatory, but, in general, it is a suitable logical scheme to be referred to by the various application programs for the PR 1350 printer handling sequences.

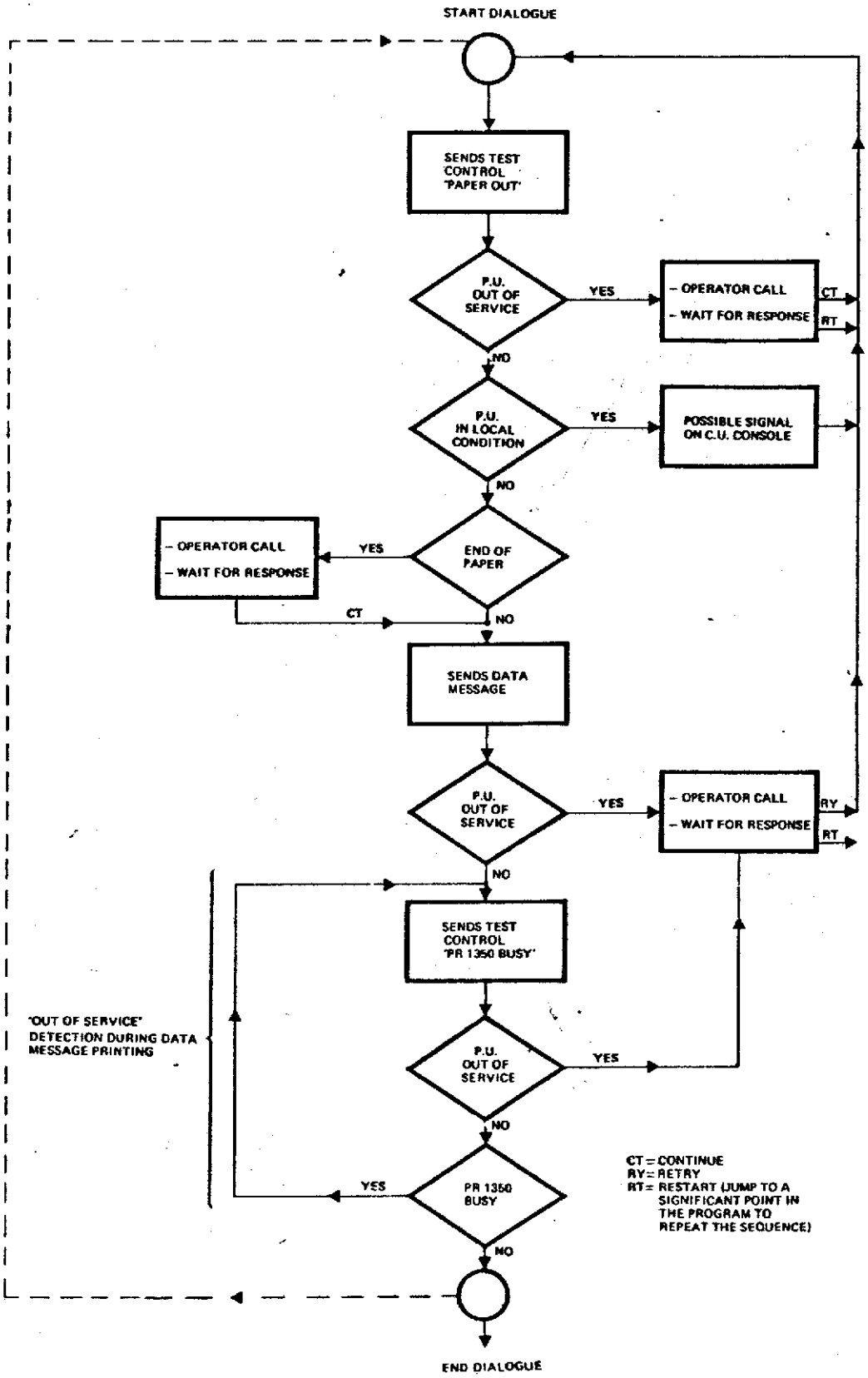


Figure 8-1 PR 1350 Standard Programming Flow

To overlap the PR 1350 printing time with the C.U. processing time, the illustrated standard programming flow must stop at "P.U. out of service?" check after "sends data message" instruction, i.e.: the programming flow does not include the sequence within brackets in figure 8-1.
In this case, when the response to "P.U. out of service?" check is negative, it indicates that the data message transfer from C.U. to P.U. has been carried out correctly; as the response is positive, it may be necessary to repeat the previous print operation when the data message has not been printed correctly.

9. OPERATING PROCEDURE

PR 1350, because typically "unattended", has very easy operating problems.
Paper, in fan-fold forms, is always fed from downside and backside collected; sprockets are laterally adjustable and easily handled.
The printing head movement, allowing the adapting to the paper thickness is easily carried out by a knob on the left side (into the casing).
Levers and operating switches on the console can be easily reached and are standing out, the same for light indicators.
On-off switch is located under the mechanic unit on the right zone of stand-off fore side of PR 1350.

Manual Controls

PR 1350 is equipped with the following manual controls.

Printing Intensity Adjustment Knob

The printing intensity adjustment is carried out by setting a knob located on the left side of the machine: 7 positions are possible for this knob.
With reference to figure 9-1, the operator:

- lifts the printer cover
- rotates the knob from position 1 toward position 7 for reducing the stroke intensity (position 7 corresponds to the maximum distance between the head and the stroke bar and is used exclusively for paper feed).

Paper Movement Knob

On the right side of PR 1350, the knob is accessible after lifting the casing cover; it allows the manual paper shift in both directions.
By pushing the knob leftwards, the sprockets are released and the paper can manually be aligned (clutch).

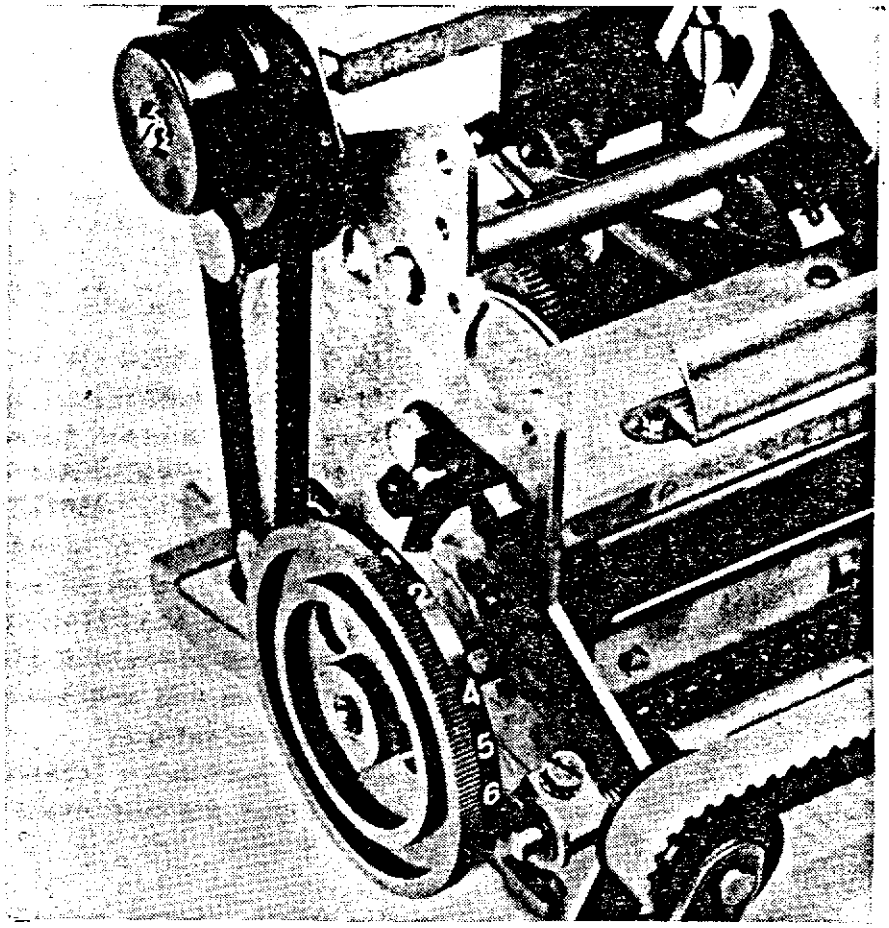


Figure 9-1 Stroke Adjustment Knob

Opening and Closing Lever for MFF 4806 Rollers

When the printer is equipped with the MFF (manual front feeder), a lever on the PR 1350 left side allows the manual control of rollers opening and closing (see figures 1-1 and 9-6).

Replacement of Ribbon Cartridge

The ribbon cartridge must be replaced when the character printing becomes faded. For replacement, the operator must carry out the following operations (see figure 9-2), by setting the PR 1350 in LOCAL:

- lift the printer cover
- lift the MFF (when attached to the machine)
- move the printing head away from impact bar, by setting the stroke adjustment knob on position 7
- lift the used cartridge

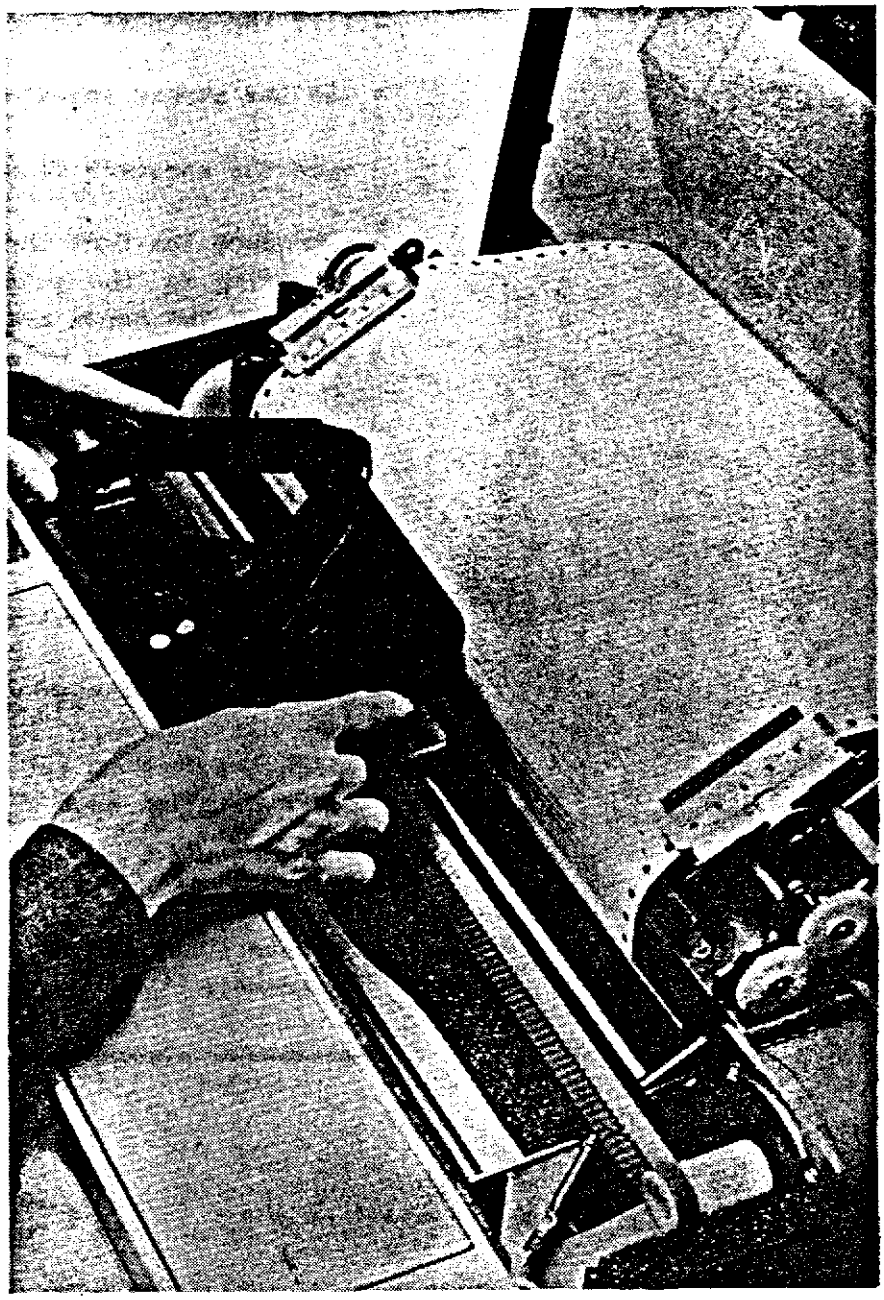


Figure 9-2 Replacement of Ribbon Cartridge

- insert the new cartridge on reference pins by pushing it on the printing head carriage

- approach the printing head again, by setting the stroke adjustment knob on the required position.

Paper Feed-in

The "fan-fold" forms are to be fed into PR 1350 according to the following procedure, with OFF machine and after removing the last form:

- put a form parcel into the PR 1350 lower tray

- lift the printer cover

- set the stroke adjustment knob in position 7

- open the sprocket fins

- introduce the form through the slot located downside according to the path of figures 9-3, 9-4, 9-5. With MFF the cards are fed from above and the continuous form from below

- adjust the lateral position of the sprockets according to the width of the forms (the graduated scale helps to adjust the form correctly) and reclose the sprocket fins

- reset the head adjustment knob to the wanted position

- reclose the printing cover

- align the form on 1st printing line by means of the paper rotation knob

- switch ON the PR 1350

- operate LOCAL and FF (form phasing) control switches on console.

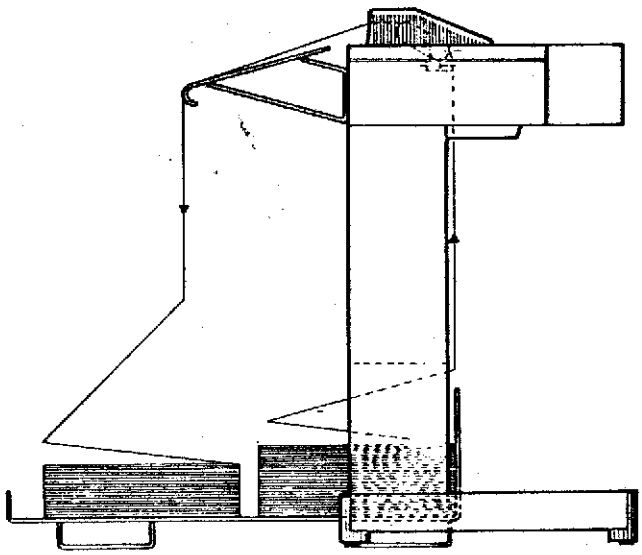


Figure 9-3 Paper Path into the PR 1350

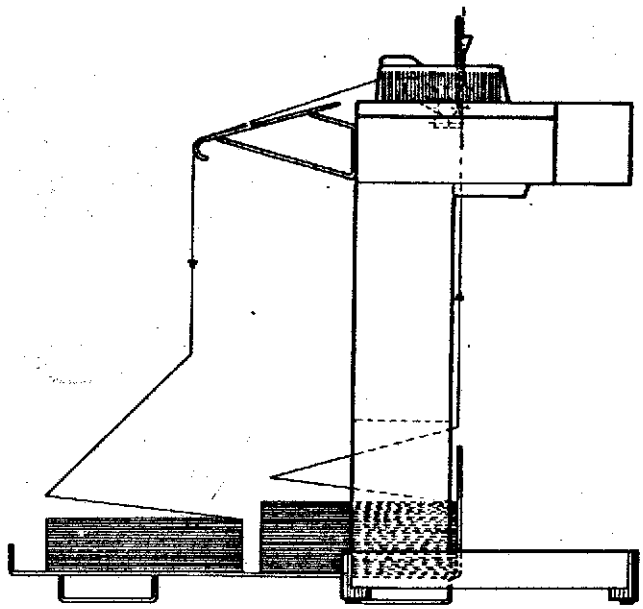


Figure 9-4 Paper Path into the PR 1350 equipped with MFF 4806

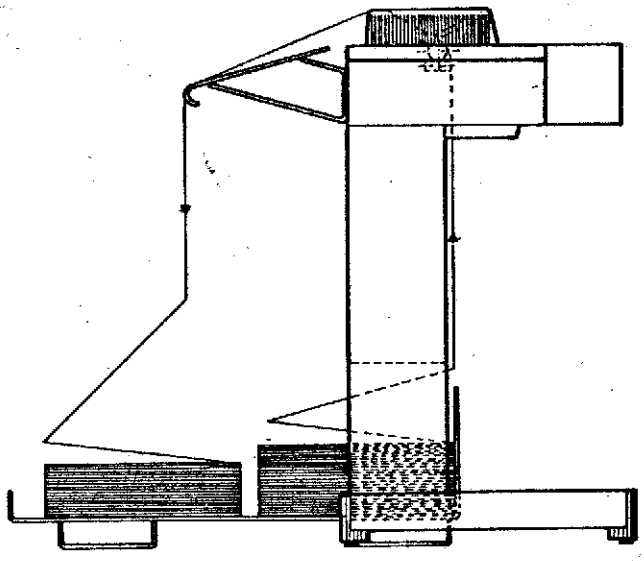
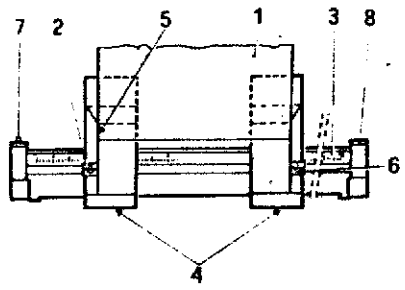


Figure 9-5 Paper Path into the PR 1350 equipped with PFD 4813



If the printer has the MFF option, cards are introduced by carrying-out the following procedure (see the side figure):

- open the card traction rollers by means of lever 7 .
- press the key (2) and adjust the left card guide with respect to scale (3), allowing the positioning of left card guide on a determined position of maximum length line (132 or 220 characters)
- introduce the card (1) and maintain the card close to left card guide (5)
- press the key (6) and adjust the right card guide; a small card clearance is necessary
- position the card with alignment on lower edges (4) of the baffles; lower baffle edges are located at a distance of 4 line spaces over the line which will be printed on card; it is possible, by referring to the baffles, to realign a printed card after it has been taken out of the machine
- close the rollers tracting the card by acting on lever (7).

Assembling Operation of Punched Tape Loop

With PR 1350 in LOCAL, the punched tape loop is to be assembled as follows:

- open the upper cover of the printer
- open the cover of tape reader
- insert the tape into the reader as, during the movement, the superimposed part of the loop does not jam into the reading device
- check the traction roller pins; they must protude out of the tape traction holes
- press the form phasing key (FF) on the console, to stop the loop at top of form position
- align the form on the first print line by means of the paper movement knob

- close the reader cover and the printer cover

- the printer is now capable of running correctly; if it is switched off, the phasing between the form and the loop does not change.

Console

Operating console is located on the right upper fore side of the printer; it consists of 4 control switches and 4 light signalling (see figure 9-1).
Control switches and signalling carry-out the operations described below.

Control Switches

- TEST
  this switch is used to insert the program for general operating test at operator level (test mode); this switch, with printer in LOCAL, generates the following three operation sequences according to the position of programming plug on STAB2 board:

  . printing of buffer contents (1)

  . line space

  . printing the whole character set on two lines, one in elongated characters (66 characters at 10 char/in and 110 characters at 16.6 char/in) and one in normal characters (132 or 220 characters respectively) with pitch selection by console

  . continuous clockwise rotation of the motor for carriage movement (2)

  . continuous counterclockwise rotation of the motor for carriage movement (3).

  The two above operations are useful for adjusting the motor at the Customer work station; service engineer sets correctly the programming plug.

  The first operation sequence is the general operation check of the printer at operator level and the programming plug is set in corresponding position, when the machine is assembled at the factory; op-

tionally it may not be set

- LOCAL - AUTOM
  this switch allows the automatic and local operation

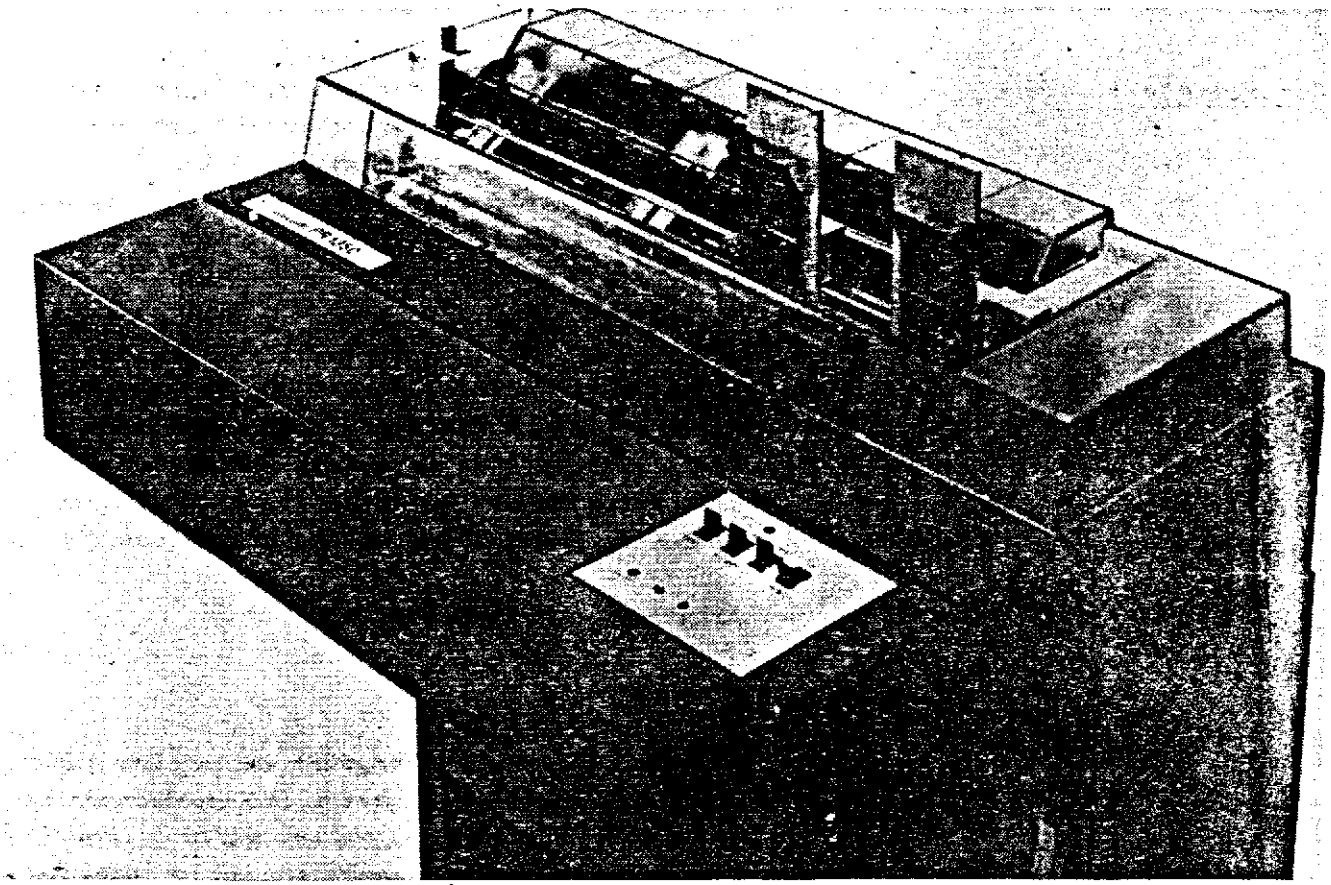


Figure 9-6 PR 1350 Operating Console and ON-OFF Switch

- FF (form feed) - LF (line feed)
  in LOCAL, this switch gives two controls: when set toward the back of printer, it controls the form feed (FF); when set toward the operator, it controls the line spacing (LF), one line space at a time until it is pressed

- 10 - 16.6
  when positioned toward the operator, the 16.6 char/in pitch is selected: 10 char/in pitch in the other position

Light Indicators

- ON - OFF
  this "led", in the lower part of the console, is lit

when the printer is switched-on

- LOCAL condition
  this "led", located over the LOCAL switch, is lit when the printer is in LOCAL condition (if the optional jumper 6 is set)

- CONNECT condition
  this "led", in the lower part of the console, has meaning only when the printer is connected to the line; it is lit when the printer is connected to the line and the PR 1350 is in "ready" condition (addressed interface)

- CARRIER detector
  this "led", in the lower part of the console, has meaning only when the printer is connected to the modem; it is lit when the carrier is present on the reception channel.

10. PHYSICAL FEATURES

Electrical Characteristics

Power supply unit is included in the machine and is available in two versions: 50 or 60 Hz mains frequency.
The following table gives the possible supply voltages and frequencies.

MAINS VOLTAGE (nominal value)	TOLERANCE	FREQUENCY
100 V 115 V 220 V	+ 10% - 15%	60 Hz
100 V 120 V 220 V 240 V	+ 10% - 15%	50 Hz

Power: 180 VA

Size

Maximum size of the unit with relevant casing is:

- width : 0.60 m (23.2 in)
- height : 0.85 m (33.4 in)
- depth : 0.42 m (16.5 in)
- weight : 38 kg (84 lb)

Equipped Accessories

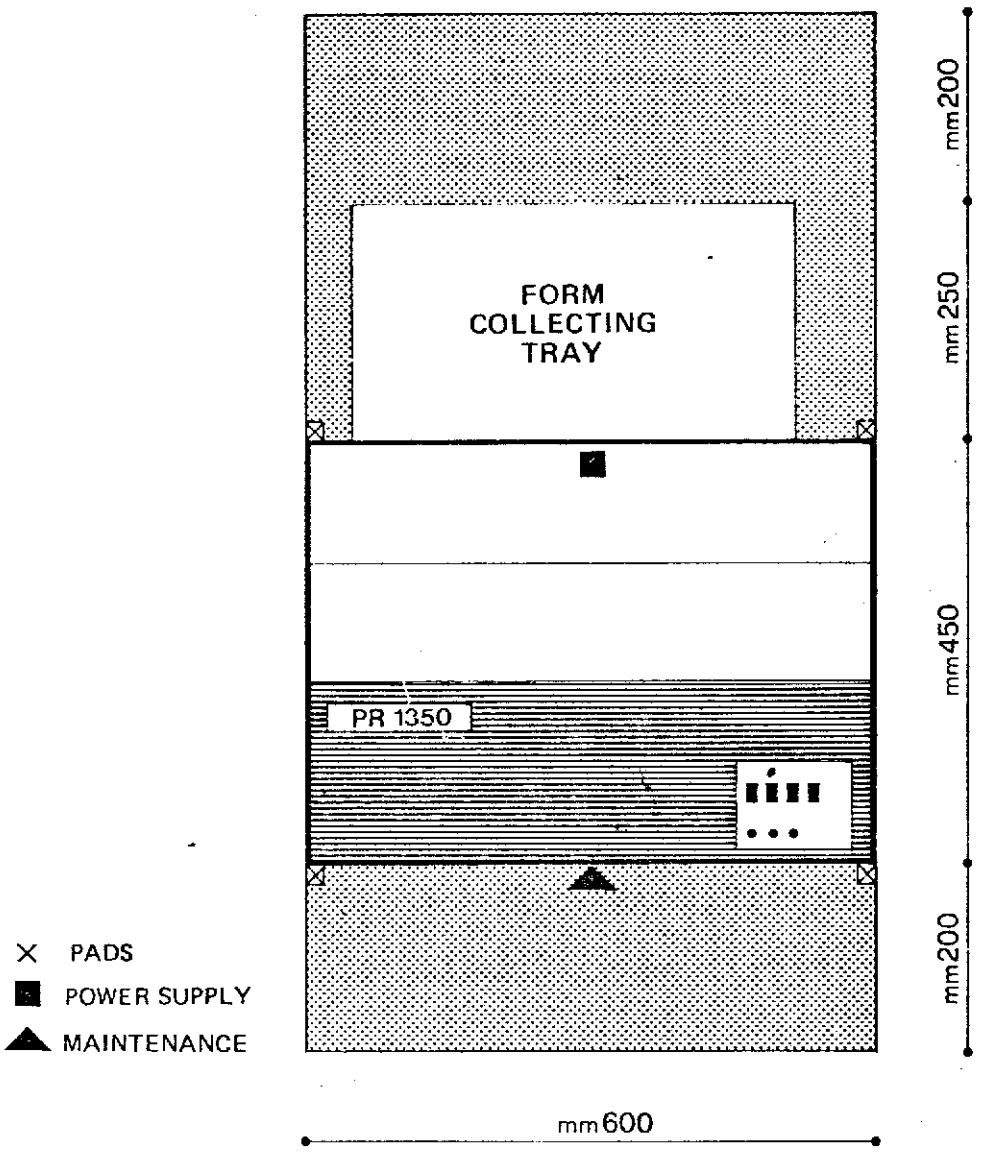
The printer is equipped with the following accessories:

- tray for forms to be printed and for printed forms

- power card, without plug, 2.50 m (98.4 in) long

- IPSO cable, 2.50 m (98.4 in) long (1.7 m protruding out of the printer).

Work Station



PR 1350 is a "desk size" unit, i.e.: the stand is included in the printer.

The planimetry of the zone occupied by PR 1350 printer and its service area are given at page 10-2.

Environmental Conditions for Operation and Storage

- operation:

  . temperature : 10° to 35° C
  . relative humidity: 20% to 80%

- storage:

  . temperature : 10° to 50° C (room temperature)

  . relative humidity: 10% to 90% (without condensation).

Printed in Italy